THE BOSTON MARINE WORKS

FINAL

ENVIRONMENTAL

IMPACT

REPORT

EOEA NO. 6407

EAST BOSTON, MA.

PREPARED FOR:

CASHMAN MARINE ENTERPRISES
800 BRIDGE STREET
NORTH WEYMOUTH, MA. 02191-0075

PREPARED BY:

HMM ASSOCIATES, INC.
ENVIRONMENTAL CONSULTANTS,
ENGINEERS AND PLANNERS
336 BAKER AVENUE
CONCORD, MA. 01742

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HMM Document No. 2314/ENV-450

January 30, 1988

Prepared for:

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800 Bridge Street
North Weymouth, MA 02191-0075

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This Final Environmental Impact Report (Final EIR) has been prepared for Cashman Marine Enterprises by HMM Associates, Inc. with assistance from John Gaythwaite, P.E., Consulting Marine Civil, Ocean, and Structural Engineer, Joseph M. Forns of the Applied Marine Ecology Lab, and David Galler Associates, Inc., Architects.

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EXECUTIVE SUMMARY

"ANY PRACTICAL HARBOR LAND USE POLICY
REQUIRES A SOUND ECONOMIC BASE."

The above quote from the Boston Harbor Associates' "Boston Inner Harbor Water-Dependent Use Report, October, 1986" recognizes the delicate balance between economic viability and suitable land use planning for today's Boston Harbor. Recent trends of developing condominiums, hotels and office complexes on or near the harbor have contributed to a short-term economic resurgence in Boston, but these residential and commercial uses contribute little, if at all, to the long-term marine-dependent needs of the port itself. As the Boston Harbor Associates study concluded: "In the longer term there are many diverse benefits to be realized in the harbor including maritime employment, import/export business, and expansion of recreational uses."

The following pages contain the Final Environmental Impact Report for the Boston Marine Works. It details the plans of Cashman Marine Enterprises to redevelop the recently bankrupt Boston Shipyard Corporation site into a mixed-use complex able to sustain itself economically while providing essential marine-dependent uses for the Boston area. While ship repair activities would continue to be a "predominant" use at the site (for commuter vessels, fishing boats, barges, tugs and other essential harbor vessels), the site would also accomodate marine contracting, a marine services zone with a deepwater recreational component (reduced from 240 slips in the Draft EIR to 208 slips), marine fabricating and industrial uses, and commercial/office space again geared to "marine" users. While each of these functions would operate independently, the site would remain unified through its overall marine orientation. We feel this multi-tenant, mixed-use approach to marine development at the site is the best method to establish an "economic base" necessary to preserve essential marine services for the Boston region.

SECTION 1

1.0 SECRETARIAL DECISIONS

CERTIFICATE OF THE SECRETARY OF ENVIRONMENTAL AFFAIRS ON THE DRAFT ENVIRONMENTAL IMPACT REPORT

1.1 Background

On January 14, 1987 Cashman Marine Enterprises submitted an ENF for the proposed reuse of the former Boston Shipyard Corporation site and requested a waiver from the requirement to prepare an EIR before proceeding with the "Phase 1" rehabilitation of the shipyard facilities pursuant to the provisions in Section 301 CMR 11.18 (3) of the MEPA regulations. Phase 1 is the proposed reuse, rehabilitation and reactivation of the shipyard facilities including the existing buildings, piers, and graving drydock.

In the Final Record of Decision on the ENF for the Boston Marine Works (EOEA #6407) issued March 30, 1987, the Secretary determined that the reuse, rehabilitation and reactivation of the Phase 1 portion of the project was not significant enough to warrant an EIR review, that said work was severable and independent from the uses proposed in Phase 2, that the EIR for the remaining work would provide useful information, and that the requirement for hardship had been met. Therefore, the Secretary issued the waiver, allowing Phase 1 rehabilitation of existing buildings, piers, and the graving dock to proceed, as provided for under the proponent's lease with Massport, and conditioned the waiver upon completion of an EIR. A tentative decision to this effect was published in the Monitor, public comments were received for 14 days on the proposed decision and the decision was issued as the Final Record of Decision on March 30, 1987.

1.2 Summary of Secretarial Decision on Draft EIR

On August 15, 1987, the Draft EIR for the Boston Marine Works project was submitted to MEPA. That document described the project in detail and evaluated the potential for environmental impacts due to reuse and rehabilitation of the former shipyard facility in the areas of marine-related issues, hazardous materials, sewage and stormwater disposal, traffic, marina design and public access. On October 2, 1987, the Certificate of the Secretary on the Draft EIR was issued, finding that the report complied with MEPA implementing regulations.

The Secretary's decision required the preparation of a Final EIR to further evaluate the effect of reusing this waterfront area and requested more detailed information in the areas of shipyard expansion as an alterative to the program proposed for Phase 2, truck traffic, water transportation, off-peak transit, parking, and Chapter 91 - Tidelands permitting.

This Final EIR document is being filed to respond to the questions and comments from the MEPA Unit and the commenting agencies. Specific responses to the MEPA comments on the Draft EIR, and those of other interested agencies, are contained within the appropriate sections of this Final EIR. Section 8.0 of this Final EIR identifies each comment and provides a reference to where the response is located within the document. A copy of the Secretary's decision on the Draft EIR, issued on October 2, 1987, and the Final Record of Decision on the ENF, issued March 30, 1987, are attached as Appendix A. The ENF document submitted January 14, 1987 is attached as Appendix B.

SECTION 2

2.0 PROJECT SUMMARY

2.1 Name of Project

The Boston Marine Works is the project name for the proposed reuse of the former Boston Shipyard Corporation site.

2.2 State Identification Numbers

- Executive Office of Environmental Affairs. The EOEA number assigned to this project is 6407.
- Department of Environmental Quality Engineering Wetlands Protection Act filing. The DEQE file number assigned to this project is 6-357.
- Department of Environmental Quality Engineering/DWPC - Water Quality Certification filing. No DEQE-WQC file number has been assigned at this time.
- Massachusetts Office of Coastal Zone Management. No MCZM file numbers have been assigned at this time.

2.3 Status of the EIR

This is the Final EIR for the Boston Marine Works project.

2.4 Changes in the Project Since Submission of the Draft EIR

There have been several changes to the project design since submission of the Draft EIR on August 15, 1987, and they are summarized as follows.

- The Zone 1 - Marine-Dependent Industrial uses remain the same.
- The Zone 2 - A Commercial/Recreational Marine Services component has been developed revising the recreational marina proposal in two ways. The marina and waterfront area will now be a dual purpose marine services area that will be utilized for in-water storage of commercial and excursion vessels during the

non-recreational period (November through April). In addition, the marina size has been reduced to provide for 208 slips instead of the 240 slips evaluated in the Draft EIR. This decrease in the number of slips has also reduced sewage discharge and the parking requirements.

- The Zone 3 - Office/Commercial Zone component of this project remains essentially consistent with the zone as described in the Draft EIR. The proponent acknowledges that he will seek marine users as occupants for as much of this space as is possible.

2.5 Project Description

A Draft Environmental Impact Report (Draft EIR) was submitted to MEPA on August 15, 1987. It examined the anticipated impacts on the environment associated with the proposed reuse of the shipyard's 13.5± acres of land and piers, and 20.8 acres of water. This Final EIR for the proposed reuse of the Boston Shipyard Corporation site as the Boston Marine Works addresses the comments made on the Draft EIR, and analyzes the anticipated changes in further detail.

The proposed Boston Marine Works project is the reuse and rehabilitation of the existing buildings, cranes, piers and yard area previously operated by the Boston Shipyard Corporation (BSC) adjacent to the East Boston Piers 1-5. The redevelopment will create a mix of uses in three zones (marine-dependent industrial, commercial/recreational marine services, and office/commercial) on the 13.5± acres of land and piers and 20.8 acres of water within the pierhead line on Boston Harbor in East Boston, Massachusetts.

Approximately 64% of the existing land and water area at the site will be rehabilitated for continued service as a marine-dependent industrial use, providing needed ship repair facilities to meet the existing and future market demands for such services. Approximately 31% of the existing land and water area will be developed into commercial/recreational marine services area that is expected to create a base load of work for the shipyard operation. The remaining 5% of the site will serve as office and commercial/industrial use. No significant new construction is proposed, and no filling or dredging of coastal wetland or tideland resources is proposed. The three general components are described as follows:

- Zone 1 - A Marine-Dependent Industrial Zone

  A 21.9 acre area composed of 7.6± acres of land and four piers, and 14.3± acres of water will be utilized for the marine-dependent industrial zone. This area will be used primarily for a variety of ship repair activities, and as a storage, staging, and an operational site for the proponent's marine contracting business. Docking for small to medium size commercial, excursion, and fishing boats and barges will be provided between Piers 2 and 3. Docking will also be provided along Piers 3 and 4 near the graving dry dock. Approximately 120 existing parking spaces will serve the marine-dependent industrial zone.

  Zone 1 improvements are being undertaken in Phase 1. Physical improvements have begun and the proponent has begun to lease space to marine industrial users.

- Zone 2 - A Commercial/Recreational Marine Services Zone

  Marine-dependent uses which serve both commercial and recreational vessels will be developed in Zone 2 during Phase 2 of project development. These activities are integrated into the overall concept for reuse of the shipyard. A 3.1 acre area of land and piers and a 7.5 acre water area (total 10.6 acres) will be developed to serve these dual uses. A 208 slip recreational marina facility will be established and operated during the recreational boating season. It will include restrooms with showers, pump-out service, fuel service, boat sales, and repair services. A 100 seat restaurant is proposed as an ancillary use to serve the on-site employees as well as the public who will visit the site. General parking for 122 cars will be provided. In addition, the commercial/recreational marine service zone will share the adjacent 72 spaces of office/commercial zone parking.

  During the off-season (October 15 to April 30), the marina facility will be used by commercial vessels. Space will be made available for these vessels by removing a significant number of the finger piers to accommodate commercial docking and off-season maintenance by owners and crews.

- Zone 3 - Office/Commercial Zone

  Zone 3 is the office/commercial zone being renovated during Phase 1 by the project proponent. The development will use a 1.8 acre upland area for the renovation of existing office and commercial/industrial facilities. The facilities include one small office building and two industrial buildings which may be leased to non-marine-related users if the proponent is unable to find marine-dependent tenants willing to assume market rate leases for the space. Approximately 72 existing parking spaces will serve these uses. These uses will also share the 122 spaces with the marina during the work week and off-season.

2.6 Permits and Financial Assistance Required

Federal

- U.S. Army Corps of Engineers. A Section 10 permit to authorize the placement of floats for the floating breakwater and slips to create the proposed commercial/recreational marina use.

State

- Massachusetts Environmental Policy Act -- Based on the information contained in an Environmental Notification Form (ENF), the Secretary of the Executive Office of Environmental Affairs determined that an Environmental Impact Report (EIR) was required. Accordingly, a Draft EIR was prepared and submitted on August 15, 1987. The Secretary of Environmental Affairs issued a certificate of adequacy for the Draft EIR on October 2, 1987, along with copies of public review comments on the document. This Final EIR was prepared to respond to the comments received on the Draft EIR. Once the notice of the availability of this Final EIR has been published in the Environmental Monitor, a final 30-day public comment period will begin. At the end of those 30 days, the Secretary, with the benefit of all comments received, will decide, within 7 days, whether environmental impacts are adequately addressed in this report. State permits, which are dependent upon

approval of the EIR, could be issued 60 days after the availability of the Final EIR. State agencies will use the information represented in the Final EIR to make their Section 61 determinations regarding mitigation of the project's environmental impacts.

- Massachusetts Office of Coastal Zone Management (MCZM) - A CZM Consistency Certification is necessary for issuance of the COE Section 10 Permit.

- Massachusetts Department of Environmental Quality Engineering

  - Division of Wetlands and Waterways Regulation, Chapter 91 - Waterways License. By letter dated January 26, 1988, Massport has informed Boston Marine Works that Massport and its projects are exempt from the licensing requirements of Chapter 91 (see attached letter at Appendix C). Boston Marine Works, however, reserves the right to file for a Chapter 91 License if such filing would facilitate the development of this important project for Boston Harbor.

  - Division of Water Pollution Control, Water Quality Certification (for COE Section 10 permit)

Local

- Wetlands Protection Act, Order of Conditions from the City of Boston Conservation Commission for work within 100 feet of the top of the Coastal Bank, for work within Land Subject to Coastal Storm Flowage, and for Land Under the Ocean.

- Although Massport is exempt from local zoning (see attached letter at Appendix C), Massport, in the development of its waterfront properties, has consistently taken into consideration the objectives of the City of Boston as expressed in the Harborpark and Marine Economic Reserve Zone policies. The proposed site is zoned industrial and the project as proposed is consistent with applicable zoning. The proposed site uses are also consistent with the proposed Harborpark Marine Economic Reserve Zone. Public access to the Phase 2 marine services area will be provided in a manner that is consistent with Harborpark standards.

- A City of Boston, Air Pollution Control Commission, Permit for Sandblasting Activities. This permit application has been submitted, and approved.

Financial Assistance

In order to rehabilitate the deteriorated Boston Shipyard Corporation facility into an efficient mixed-use marine center, as planned under the Boston Marine Works concept, a significant financial commitment is necessary on the part of the proponent, Cashman Marine Enterprises. The existing 220,000± square feet of building space at the site requires substantial renovation befitting its 40-80 years of age, and many years of neglect. Some of the essential work includes: installation of separate heating/cooling systems for individual tenants (the pre-existing centralized steam boiler system was extremely inefficient and expensive to operate); installation of individual electric services; new roofing; window replacement and repair; facade improvements and repairs; new and repaired plumbing facilities; and interior tenant improvements such as partitions, carpet, tile, sheetrock and painting. These building repairs and renovations alone will likely cost in the vicinity of \$3 to \$3.5 million. Site improvements such as repaving, landscaping, lighting, street furniture and signage, fencing, etc. are expected to cost an additional \$500,000. Improvements to piers, the graving dock and development of marine float systems are expected to be in the range of \$1.5 to \$2 million. This brings the anticipated overall Boston Marine Works concept redevelopment costs to between \$5 and \$6 million.

The first round of this financial investment has been initiated during the past year upon receipt of the Phase 1 waiver granted by MEPA. Funds being used for this purpose include a \$1,000,000 private loan secured from U.S. Trust Company, \$350,000 in funds from the proponent, and a \$350,000 loan being obtained through the East Boston Community Development Corporation (EBCDC). The latter loan is the result of the EBCDC's presentation of an industrial development proposal for strengthening and expanding efforts for economic growth in the local East Boston Community to the Office of Community Services (U.S. Department of Health and Human Services). This proposal was ranked in the top ten on a national basis for its benefits in promoting stable employment and promoting industrial development. Furthermore, as the proponent repays the EBCDC loan, the repayments will be reinvested in other programs that benefit the East Boston Community.

2.7 Summary of Major Environmental Effects

Aesthetics

The visual character of the area will be improved as a result of this project. The improvements include renovations to existing buildings. The renovations will take place within the envelope of the existing structures. A site that had been in a state of disrepair will be rehabilitated to an active, mixed-use development. Most of the existing buildings will be attractively refurbished and painted, and some landscaping will be provided. Particularly, a new landscaping treatment will be provided at the entrance. Vistas towards Boston Harbor and the City of Boston skyline will be preserved by re-establishing a working waterfront with medium-size vessels docked in the marine-dependent industrial portion of the site and recreational and small commercial vessels docked in the marina. The marine services portion of the site will include public access ways from which the vistas may be enjoyed.

Marine-Related Uses

A portion of an existing Designated Port Area that formerly served marine-dependent-industrial uses will now be utilized to serve a combination of marine dependent-industrial, and recreational marine-dependent uses. This mixed use component is designed to serve as an integral part of the larger marine-dependent-industrial program and financially support the reuse of the shipyard facilities.

Hazardous Waste

The volume of hazardous materials typically used at this ship repair facility will limit it to "small quantity" generator status. A licensed hazardous waste transporter will be employed for waste pick-ups. The proponent's implementation of a hazardous materials management plan will result in significant improvements in the storage, control and use of oil, gas, paints, solvents and other chemicals normally associated with a commercial marine repair facility. Likewise, spill control designs will reduce the risk of hazardous materials being introduced to the harbor.

Sewer

The project will generate 15,885± gallons per day discharge to the existing BWSC East Boston branch sewer system which presently serves this shipyard site. This wastewater discharge eventually flows to the MWRA Winthrop Terminal facilities. The proposed reuse of the shipyard as the Boston Marine Works will generate less sewage discharge than the previous Boston Shipyard Corporation operation. A vessel sewage pump-out capability has been incorporated into the marina designs.

Traffic

It has been estimated that the former BSC shipyard use generated up to 3,006 vehicle trips per day. The initial Phase 1 rehabilitation and reuse as the Boston Marine Works will generate an estimated 702 (351 in and 351 out) vehicle trips per day to the neighborhood street system. Later development of the marine industrial uses and the Phase 2 marine services area and office/industrial uses will generate up to 1,040 (520 in and 520 out) additional trips per day including the summertime marina use. But it is anticipated that most of the marine-related trips will occur on weekends when vessel repair facilities and most office uses are closed.

Site Drainage/Runoff

The majority of the shipyard consists of impervious surfaces served by stormwater collection and drainage systems. Approximately 75% of the existing site area drains directly to Boston Harbor. There will be no significant change in on-site impervious area. Site drainage will be improved to provide oil and gas traps to intercept surface runoff discharged to the harbor. The stormwater contribution from the remainder of the site to the combined sewer in Marginal Street will not change.

2.8 Summary of Mitigation Measures Proposed

- Marine-Related Uses - Use of the majority of the shipyard for marine-dependent industrial uses, use of the remaining waterfront for a marine-dependent marine services area providing both commercial and recreational marina services, giving priority to marine-related uses, and confining the non-marine-dependent office, commercial/industrial uses to largely existing office space located on historic upland in accordance with DEQE - Chapter 91 regulatory policy will mitigate the potential licensing impacts for non-conforming land uses.

- Hazardous Waste - Cashman's implementation of a hazardous materials management plan for control of, use and storage of chemicals and fuels normally used at a commercial marine repair facility will provide mitigation in compliance with DEQE and Boston Fire Department regulations.

- Sewer - Provision of grease traps in kitchen operations, use of low flow toilets, flow restricting faucets and showers will further reduce wastewater discharges to the BWSC system. Oil and gas traps in catchbasins to intercept surface runoff will mitigate potential water quality impacts to the harbor.

- Traffic - Mitigation measures to offset the generation of traffic due to the reuse of these facilities include local hiring, car pooling, use of nearby public transportation, providing a landing for water borne access from downtown to the site, and staggered hours for work and use of the site.

SECTION 3

3.0 PROJECT DESCRIPTION

3.1 Introduction

In December 1985 the Massachusetts Port Authority (Massport) acquired the Boston Shipyard Corporation property on the East Boston waterfront. The property consists of approximately 13.5 acres of land and piers, and 20.8 acres of water. The shipyard is bounded by the Massport Naval Fuel Pier facility, to the east, by the Massport East Boston piers #1-5, to the west, by the Jeffries Point residential neighborhood, to the north, and by the Boston Inner Harbor pierhead and bulkhead line to the south. The site locus is shown in Figure 3-1.

Over the past century and a half, the project site has been used predominantly for marine-dependent uses. In the late 1800's, the western portion of the site was used as a passenger and railroad ferry terminal and a coal transfer facility. The central portion of the site was the Simpson's Patent Drydock Company. At one time, the eastern portion of the site housed the U. S. Immigration Service landing and processing point for the port of Boston. While the whole site has been serving as a shipyard construction and repair facility for at least 50 years, during the last 25 years a national decline in the use and need for these facilities has resulted in the piers, bulkheads, cranes and buildings being under-utilized and the structures falling into disrepair.

As a result of the national decline in shipbuilding and repair contracts, and the continued loss of this business to competing foreign yards, Bethlehem Steel Corporation closed the East Boston Shipyard in 1982 after having operated there for sixty (60) years. The locally owned Boston Shipyard Corporation (BSC) succeeded Bethlehem at the site in 1983. By mid-1985, however, BSC was in receivership under Chapter 11 provisions of U.S. Bankruptcy Court, signaling the apparent death knell of this facility as a shipyard. J.M. Cashman, Inc., marine contractors, submitted an offer for the site through Bankruptcy Court in September 1985 since they were seeking to relocate their marine industrial operations from Weymouth and were interested in having a facility with capabilities of providing repair for their marine vessels. This initial offer through Bankruptcy Court triggered numerous other proposals to acquire the site. The Bankruptcy Court judge then called for a sealed bid process, in which the Massachusetts Port Authority submitted the highest bid for acquiring the shipyard facility. The competing proposals were primarily from investors interested in the site for residential and commercial development due to its spectacular waterfront location whereas, Massport's interest was in preserving the site's future use as one consistent with the port's needs for marine-related industrial and commercial waterfront activities.

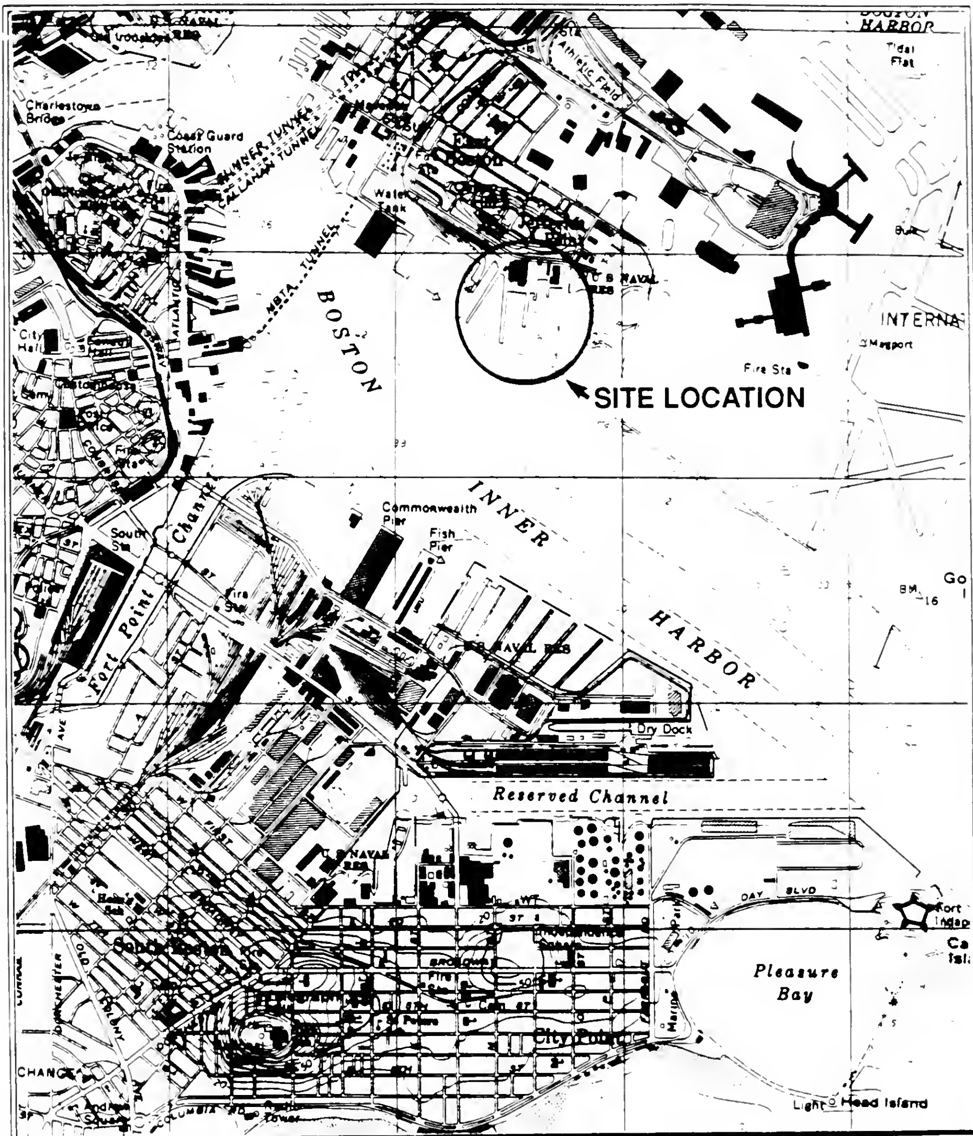


FIGURE 3-1
SITE LOCATION FOR THE BOSTON MARINE WORKS
IN EAST BOSTON, MASSACHUSETTS

Massport took title to the site on December 31, 1985 and spent the ensuing months taking inventory of equipment, having environmental and engineering studies performed, and analyzing practical alternatives for the site's reuse. When Massport issued a request for proposals (RFP) in February 1986, they required that interested parties submit proposals that were marine-related, preserved a ship repair component, and provided for an economically viable reuse of the site. After distributing over 300 RFPs to marine users and developers, Massport received proposals from four (4) entities, three (3) of whom proposed a ship repair component coupled with marine recreational use to provide a balanced program for the site that would justify the financial investment necessary to its revitalization.

After a long and thorough review of the proposals, to determine their consistency with Massport objectives for use of the site, Cashman Marine Enterprises, Inc., was selected to develop the site. The proponent's selection was based on its capacity to immediately bring to the shipyard a marine-dependent industrial use (J.M. Cashman, Inc., marine contractors), and upon their proposal to initiate a new subsidiary, Boston Graving Dock Corporation, to implement ship repair operations utilizing local labor.

To ensure that its objectives were met by the developer, Massport negotiated a long-term lease with specific provisions for redevelopment of this site. The lease agreement explicitly recognizes that the landlord (Massport) has acquired the site as part of an overall plan to promote marine-related uses in Boston Harbor and, in particular, to maintain the ship repair activities essential to a viable port. The lease terms are summarized in table form in Appendix D. The lease divided the site into three (3) zones, as shown in Figure 3-2.

- Zone 1 -- Provides for ship repair, marine contracting, marine industrial, marine warehousing and other marine-related activities. The zone has an initial lease term of 19 years.

- Zone 2 -- Allows for use as waterfront marine commercial and recreational uses. The zone has an initial lease term of 25 years.

- Zone 3 -- Permits office, industrial, and manufacturing uses, provided best efforts are used to attract marine-related users. Initial lease term for the zone is 25 years.

The lease with Massport includes specific performance standards that must be met by the proponent and its respective sub-tenants. It also requires that each sub-lease be approved by Massport.

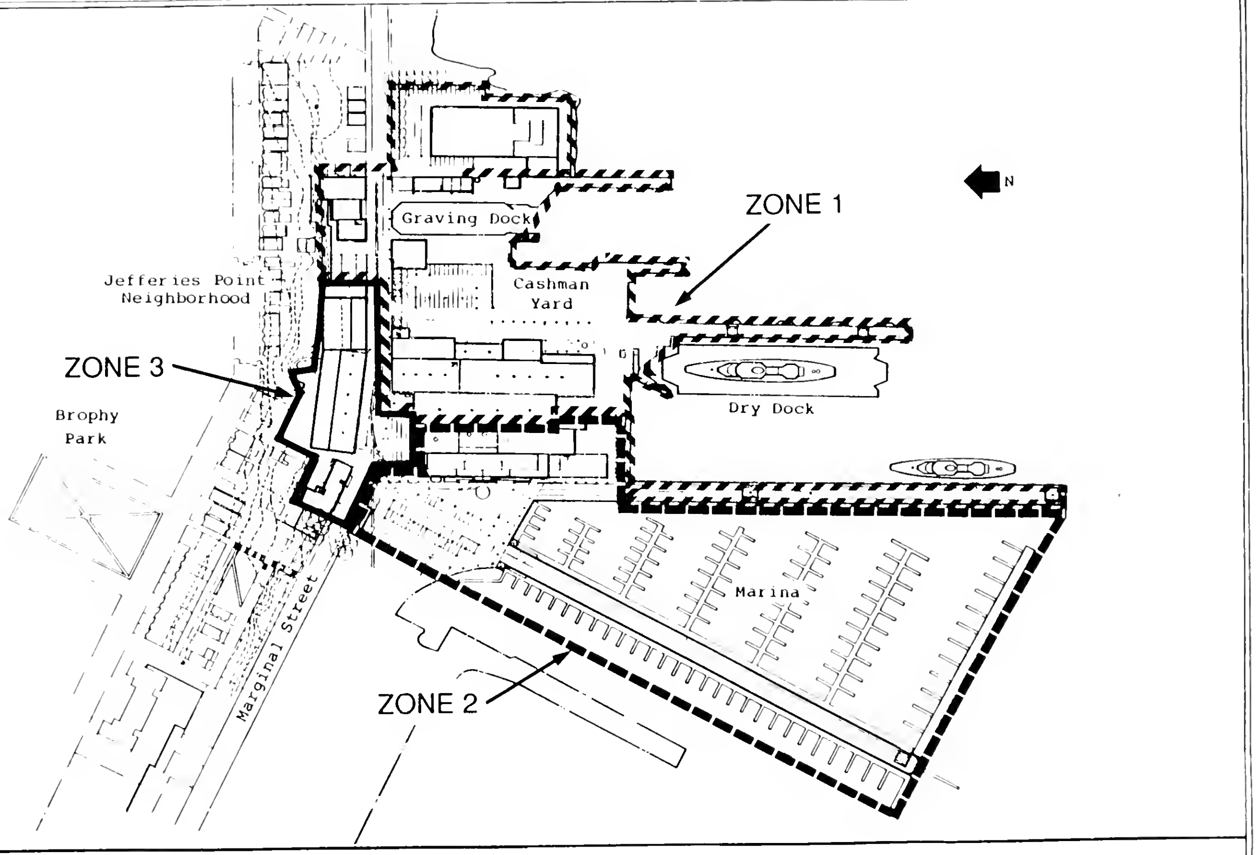


FIGURE 3-2

GENERALIZED AREAS OF PROPOSED USE

THE BOSTON MARINE WORKS

After execution of the lease with Massport, the proponent initiated an eight-month master planning program under the direction of David Galler Associates of Newton, with landscape and site design assistance from Rick Dumont Associates of Boston, and graphic design services of Clifford Selbert Design of Cambridge. This plan included a reuse report analyzing each of the buildings on the site, their characteristics and necessary improvements to convert the site into a mixed-use, multi-tenant facility. The program also addressed uniform signage criteria, the development of a site identity (the "Boston Marine Works"), plans for parking, paving, landscaping, lighting, and facade improvements. This master plan took the three specific zones described in the lease and analyzed their inter-relationships. Logical "buffer zones" were established between them so that the site could function efficiently and benefit from the synergy of the various marine-related tenants. While the plan adapts existing structures to new uses, it preserves much of the shipyard's original character. While each function operates independently, the site remains unified through its overall marine orientation.

This lease was executed on April 30, 1987, and the development of the Boston Marine Works was begun.

3.2 Existing Buildings and Waterfront Facilities

The site currently consists of 11.5 acres of upland with nineteen buildings containing roughly 220,000 s.f. of floor area. The buildings are generally of two types and periods:

1) Brick of the early 1900's; and
2) Concrete and steel frame wartime additions of the mid-1900's.

Descriptions of the existing buildings are provided as follows.

Building No. 31 - The Administration Building

This highly visible wartime era building is located at the entrance to the site, just north of the front gate. It originally served as the main administration office for the Bethlehem Shipyard. The total square footage of the administration building is 15,321 square feet on three floors. It has direct views to the Boston skyline and will overlook the proposed marine commercial/recreational service zone. A loading platform for access to storage is located on the north side of the building.

Building Nos. 12 and 32 - The Machine Shop

This concrete block and brick building, used for industrial space, is a single-story structure consisting of a series of 20-foot wide bays with 22-34 foot floor to ceiling heights. The shop is fully equipped for heavy machine use. It houses three bridge cranes and a 22 foot high overhead door for easy access and loading. Including the mezzanine in the eastern addition, the total building floor area is 31,600± sf with 205 feet of frontage on Marginal Street.

Building No. 16 - The Barracks Building

This brick and concrete structure is a combination of two original buildings and one wartime building that served the former Bethlehem Shipyard site as the fire station, commissary and garage, with ceiling heights of 11 feet, 13 feet and 23 feet, respectively. They have a total of 125 feet of frontage on Marginal Street, opposite the graving dock. The building is equipped with loading platforms for access to storage. On the first floor of the commissary is a large kitchen facility, as well locker room and washroom facilities. The total square footage of this building, including the garage mezzanine, is 15,248± sf.

Building No. 18 - The Immigration Building

Once the point of entry for immigration to the United States at the port of Boston, this brick and concrete multi-level structure is located directly off Marginal Street on the eastern portion of the site. The building's 36,400± sf are warehouse space and associated offices. There is adequate parking space fronting Marginal Street and on the west side of the building.

Building No. 17 - The Woodworking and Paint Shop

This two-story 9,660 sf building is one of the original buildings constructed of brick. It is located at the eastern edge of the yard. It is adjacent to the graving dock and has views of the Boston skyline. This is a fully equipped light-industrial woodworking facility with loading platforms on two facades. In addition, there are two small dilapidated storage buildings that are adjacent to the shop on the southern side. These will be demolished. This building also has 30 feet of frontage on Marginal Street and is sited adjacent to the working Boston Graving Dockyard facilities.

Building No. 11 - The Electricians Building

This original brick building is located between the graving dry dock and the east bay of the Combination Building. The Electricians Building has direct access to Marignal Street, the graving drydock, and Piers No. 3 and 4. The first floor is composed of three bays presently utilized as light industrial space, and the second floor is open area which is used for office space. The floor height is approximately 13 feet, and the total floor area is 6,400 sf.

The Combination Building

The Combination Building is the largest structure on-site. It consists of the four use areas described below.

Power Plant Building, Building No. 22

The power plant is a single-story concrete frame/block structure with a basement. It has a clear height of 22 feet with a total square footage of 10,709 sf. Its location has direct frontage on the proposed recreational/commercial marine services area, as well as 45 feet of frontage on Marginal Street. Loading platforms allow access for storage. In addition, the north end of the structure houses the main electrical controls for the complex.

Pipe, Copper and Sheet Metal Shop, Building Nos. 23 and 33

This steel shed building is located between the power plant and fabrication shop within the combination building. It contains 15,219 square feet of ground level service and an additional mezzanine floor of 4,160 square feet. It has both direct access to Piers No. 2 and 3, and 51 feet of frontage on Marginal Street for loading. Containing heavy machinery such as four two-ton hoists and two one-ton hoists, it is suitable for industrial/marine tenants. It has a clear height of 16-25 feet. The pipe and copper shop also has direct views to the Boston skyline. It is ideally suited for marine repair and service for commercial and recreational vessels.

The Fabrication Shop, Building Nos. 15, 24, 34, and 35

This wartime era steel, clear span structure is located at the center of the Combination Building. It is composed of two sheds; the east shed is 392 feet long and the west shed is 256 feet long, providing a combined square footage of 47,084 sf. The east bay has three stories within the northern end of the building, with ceiling heights of 17 feet, 12 feet and 8 feet, respectively. The uppermost story is a loft. The southern, or pier end of the building, is similar to the west bay, with open interior spaces and clear heights of 35-37 feet. Both buildings are fitted with three 25-ton hoists and cranes. Both sheds have access from Marginal Street and direct pier access for loading.

East Bay Combination Building, Building Nos. 13, 14, and 36

The eastern side of the combination building is made up of three original brick and concrete block buildings of various types and functions. They are situated along the working yard of Cashman Marine Contracting and Boston Graving Drydock.

The existing office building has 60 feet of frontage on Marginal Street and overlooks the yard and graving dock. The two-story building has pier access and the total square footage of the office building is 5,500± sf.

The central (rigger's) building is a single-floor structure with a small mezzanine. It contains a jib crane with hoist, and a monorail. The floor to ceiling height is 12-18 feet. The riggers building has pier access and 4,384 sf.

The former locker room building is a two-story structure with a ten-foot ceiling height and an internal light well. It has pier access and 6,118 sf.

The Officer's Barracks, At the Foot of Pier 1

The Officer's Barracks is a 6,100 sf, two-story, wartime era, concrete dormitory space. It has recently been used for storage and will be demolished to make room for additional parking.

Gate House, Building No. 21

The 740 sf concrete block Gate House has been the security office for the shipyard. This one-story building has been renovated and provides a rooftop public viewing platform, as well as continuing to serve as the site's security/information center.

Utilities

Because of its developed nature, the site is already connected to the East Boston utility service network. These utilities adequately served the former BSC shipyard needs for sanitary sewer, storm sewer, gas, telephone, water and electricity. The old shipyard also provided for steam, compressed air, and saltwater at the site.

Piers and Bulkheads

The Boston Marine Works waterfront presently includes approximately 1,600 linear feet of bulkheaded shoreline and five steel and/or woodpile supported timber pier structures. Much of the granite, concrete and wood bulkheading is concealed by wood pile supported deck projecting into the docking basins. The conditions of the bulkheading and piers have been only partially evaluated. Most of the evaluation to date has focused upon the Pier 1 area where public access will be provided.

During October, 1987, the proponent's marine engineer conducted a general condition survey of Pier 1. The inspection consisted of an overall visual examination of the underside of the pier at high water, and again at low tide, and a general topsides examination including probing of suspect structural members on a random basis. The purpose of the inspection was to ascertain the pier's overall general condition for planning of future uses and any rehabilitation work that may be required.

Pier 1 is all timber construction on timber piles. It is approximately 34 feet wide by 875 feet in length. The pier deck is approximately 14½ feet above MLW with 30 to 35 feet of water alongside at low tide. The pier was built circa 1943. The deck system was renewed in the 1950's. At that time, longitudinal steel beams were placed below the crane rails and railroad rails to provide additional support for the gantry crane.

The pier was used almost exclusively for ship repair and dockside outfitting purposes. It is equipped with a shipyard type revolving gantry crane and numerous electrical and utility systems. Record information indicates the pier was designed for a uniform live load capacity of 500 psf.

The pier is currently in poor overall condition due primarily to the deterioration of the deck system. The 6 by 8 deck planking is severely worn and weathered on its exposed top surface throughout the entire pier. Numerous holes, due to localized failure, are covered over with steel plate or plywood. At some locations, especially the most outboard 400 feet, the deck plank is in advanced stages of decay as evidenced by grass growing between the gaps. The longitudinal timber stringers, which originally supported the deck and crane rails, are severely deteriorated due to rot throughout the entire deck system. They have completely failed or disintegrated in certain locations. The deck system is currently supported by the steel beams previously mentioned, which themselves are severely corroded.

The edge stringers are in generally fair to poor condition with localized areas of severe deterioration. Most of the bits and mooring hardware have ruptured due to fastening failure, to timber decay, or both. All hardware fastenings appeared to be in poor condition and are suspect to failure with use. The timber curb or "bull rail" is in poor condition throughout. The fender system is in poor condition with many broken, loose or missing fender piles.

The piles and pile caps are in generally fair but sound condition. Many piles and caps, especially near the perimeter and outshore end of the pier, appear to be untreated due to bleaching or leaching out of the original treatment. Many piles have gaps at their top butt ends where they join the pile caps due to poor construction practice. Some support piles have shattered outer shells with longitudinal splits due to past localized overload and/or mechanical impact or abrasion. Most of the original cross-bracing is still in place, however, the fastenings are suspect, especially in the lower tide zone. Many cross-bracing members are worn from ice impact and abrasion and have cracks or splits from years of usage. Many of the batter piles are improperly secured at their top butt ends due to frequently missing chocks.

The corrugated metal fire walls, which were spaced at approximately 150 feet, have corroded away at all locations. There is evidence of past, surficial, fire damage to several pile bents along the west side of the pier near its mid length. A few support piles near the outer edge are missing in this area.

The timber deck area that leads into Pier 1 at its northwest corner shore connection was also examined. The deck planking is in generally poor condition, however, the stringers are in fair but sound condition at some locations with seemingly random areas of localized failure due to local rot or past overloading. Many piles exhibited severe deterioration at their top butt ends immediately below the caps, presumably due to poor fastening practice in the original construction. There is much rubble and construction debris on the bottom below the pier which is observable at low tide.

Rather limited attention has been given to the waterfront facilities other than Pier 1. Based upon cursory visible inspection, and by inferring general conditions from the Pier 1 inspections, it appears that the other waterfront facilities need substantial maintenance and repair activity as well.

Pier 2 is located east of Pier 1. It extends approximately 1,075 feet from the bulkhead on its westerly side, and about 824 feet from the bulkhead on its easterly side. The pier width is 42 feet. Construction is of steel and concrete with an asphalt deck. The pier has concrete stringers, fender piles and mooring bollards. The pier includes a 30-ton crane equipped with crane rails. The pier, which was originally constructed in 1943, and rebuilt in the 1960s, is in reasonable condition for its age.

To the east of Pier 2 is Pier 3. Pier 3 has a length of 530 feet and a width of 24 feet. It is equipped with wood mooring piers, concrete stringers, reinforced concrete bents, sheetpiling, fender piles, rubber bumpers and pipe railing. Pier 3 is also equipped with a 30-ton crane and crane rail. This pier was constructed between 1924 and 1930. It was extensively repaired in the 1960s. The pier shows heavy wear, and is in fair condition.

Next, to the east, is Pier 4 which was built between 1856 and 1890. It measures 100 feet in length and 20 feet in width. It is constructed of wood with wood piles and mooring cleats and a reinforced concrete deck. Despite being rebuilt in the 1960s, this older pier is in poor condition.

Most easterly of the piers is Pier 5. This pier was built in 1920 and rebuilt in the 1960s. It is constructed of wood with wood pilings and reinforced concrete. This pier is in fair condition.

The piers are supplemented by a dry dock and a graving dock. The former is a 622 foot floating dry dock that is located between Piers 2 and 3. This drydock, which is in fair condition, was built in 1929. It is constructed of steel and wood. The graving dock, shown in elevation in Figure 3-3, is the principal structure serving the shipyard repair operation. It is used in combination with the floating dry dock. The graving dock has a width of 44 feet, a length of 256 feet, and a depth of 20 feet. The graving dock was originally built in 1856 of timber walls and a clay bottom. It was improved in 1957. At present, its construction consists of reinforced concrete with wood and steel gates. The graving dock is equipped with dewatering pumps, a winch and a miter gate which holds back the sea water while work is being performed in the graving dock. The graving dock is in fair condition.

Cashman Marine Enterprises is presently investing over $1.5 million at the Boston Marine Works to repair, renovate, and upgrade buildings, ship repair facilities and piers. This represents only the first phase of an overall $5 to $6 million investment necessary to completely revitalize the facilities.

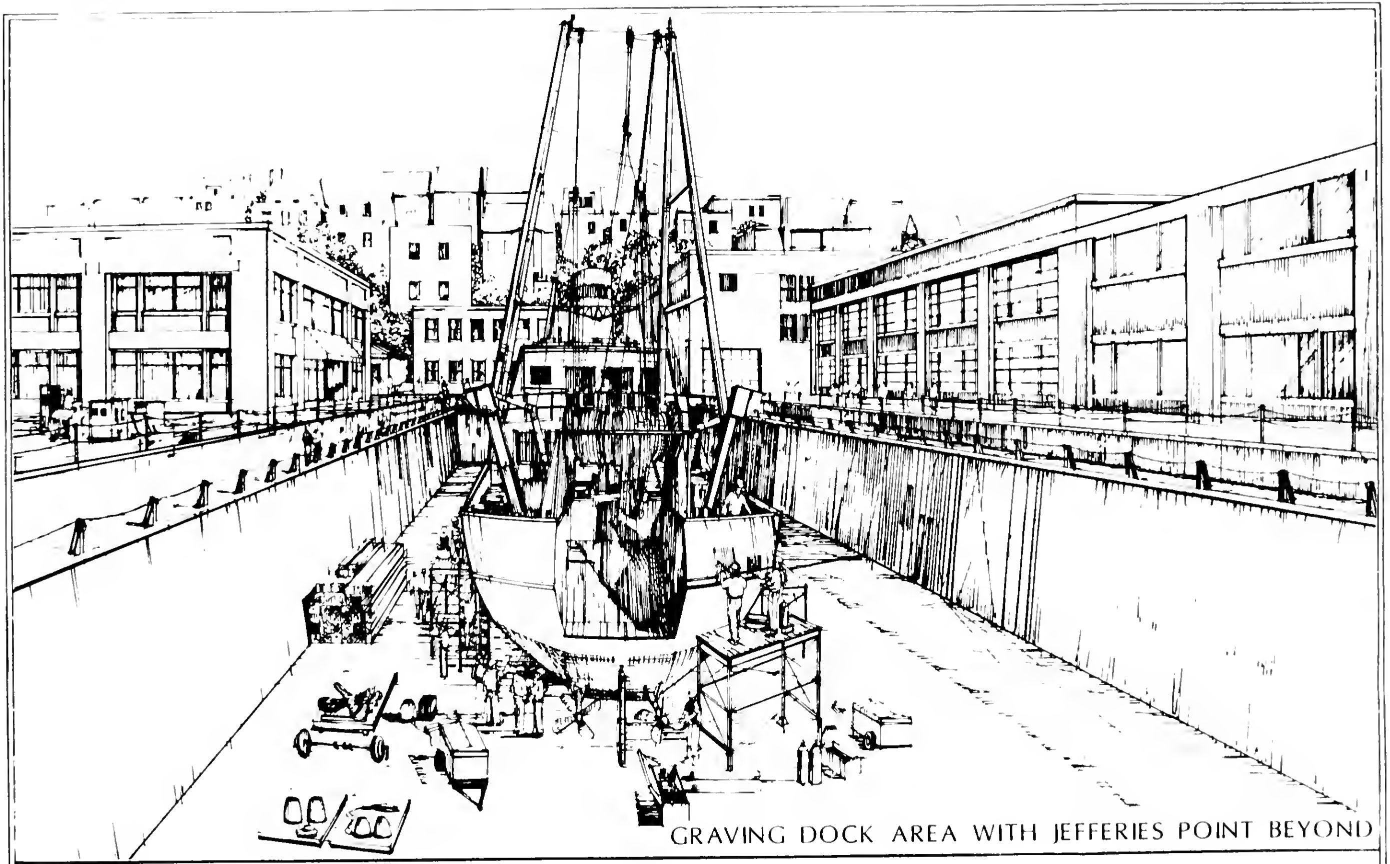


FIGURE 3-3 ELEVATION OF THE GRAVING DOCK

HMM ASSOCIATES INC.

3.3 Objectives of the Project

Both the project proponent and Massport realize that the project site is an extremely valuable harborfront resource. Its location is significant both from the standpoint of its frontage on Boston Harbor, and from the standpoint of its immediate proximity to the Jeffries Point neighborhood. Its locational characteristics are augmented by its specific site characteristics: it is a deep water port site with a history of marine industrial use. It is a site capable of supporting ship repair activity, and of providing marine industrial economic activity. This makes the site a unique resource with regional, as well as local implications. Accordingly, a successful and appropriate redevelopment of the site is extremely important. With these considerations in mind, redevelopment is being undertaken by Cashman Marine Enterprises, Inc. with several related objectives as guidance.

1) Maintain Consistency with State Regulations and Honor the Intent of City Policy for Development

   It is Massport's practice to honor the intent of regulations and policies that would apply to a private development of the site. Therefore, the Boston Marine Works project will be implemented in a manner that is consistent with the intent of State regulations and local zoning.

2) Reserve Marine Waterfront Industrial Opportunities

   The State and the City have a considerable amount of waterfront, but relatively little of it is being developed for marine-dependent uses. Therefore, a major objective of the project is ensuring the preservation of all potential marine-dependent uses of the site both now and in the future.

3) Promote an Economically Viable Waterfront Activity

   At the outset of the lease, the site was in a deteriorated and unattractive condition. The site had deteriorated to this condition because the previous BSC shipyard uses ceased to be economically viable and necessary maintenance could not be performed. Both the project proponent and Massport feel it is important that the

redevelopment of the site is economically viable. The project must generate the cash flow to improve and maintain the whole site. It must also re-establish marine industry employment opportunities.

4) Provide Public Benefits

The site presently provides no public benefits. A major objective of the project is to provide public benefits consistent with the proponent's adjacent marine industrial activities. These benefits will consist of increased pedestrian access to the waterfront, recreational and transient boating facilities, access to water taxi service to other points along the harborfront, and restaurant and marine retail facilities on the site.

5) Minimize Potential for Impacts on the Adjacent Neighborhood

The site abuts the Jeffries Point residential neighborhood which is a part of the larger East Boston community. The neighborhood is sensitive to development that would have direct or indirect impacts on the character of the neighborhood. Therefore, it is an objective of the project to minimize potential for project related impacts on the community. In particular, it is the objective of the project to be sensitive to the needs to minimize traffic and parking problems for the community.

3.4 Description of the Boston Marine Works Proposal

Cashman Marine Enterprises plans an innovative redevelopment of the project site to reuse the existing land and water areas.

As dictated by the lease with Massport, the three major elements of the Boston Marine Works project are:

- Zone 1, a 21.9 acre Marine-Dependent Industrial area composed of eight buildings on 7.6 acres of land, 4 piers and 14.3 acres of water area landward of the Pier and Bulkhead Line;

- Zone 2, a 10.6 acre Commercial/Recreational Marine Services area composed of four buildings on 3.1 acres of land, one wood pile supported timber pier and 7.5 acres of water area landward of the Pier and Bulkhead Line;

- Zone 3, a 1.8 acre Office/Industrial area composed of three buildings.

These three zones, and the buildings on-site, identified by building numbers, were previously shown in Figure 3-2 and are shown on the large plan at the end of this document. The summary of uses proposed in each zone is included in Table 3-1.

In compiling its plan for the development of the Boston Marine Works, Cashman reviewed the nature of the development site and the failures of the past operations of the site. The past owner, BSC, had operated a fairly traditional shipyard operation. The Cashman Marine Enterprises approach to ship repair, however, is unlike that of the former shipyard. The shipyard historically was operated as a single entity with employees in all necessary trades: management; bookkeeping; accounting; engineering; dock masters; welders; sandblasters; painters; marine electricians; machinists; sheet metal workers; marine carpenters, etc. Employment for these individuals was highly cyclical due to the nature of the shipbuilding/ship repair industry. The BSC operation was characterized by a large work force, heavy capital equipment requirements, high overhead and relatively small profit margins. To maintain an operation of this type required a large and constant backlog of work. For a number of reasons, BSC was unable to maintain the volume of work necessary to sustain its operations. During the last 20 years, as this industry has suffered a rapid decline in gross revenues due to 1) a national lack of private and government shipbuilding, and 2) foreign competition offering more modern facilities and cheaper labor, most of these workers have been forced to seek employment outside the shipbuilding industry. As work orders decreased, the overhead associated with maintaining a viable shipyard grew, forcing this shipyard, and other similar shipyards, to close.

The proponent concluded that the forces that closed BSC (as well as the Quincy Shipyard) were likely to make any new, traditional shipyard a very speculative venture, at best. It concluded that new concepts were needed to provide an economically viable operation for the redevelopment of the shipyard. The Boston Marine Works proposal was consequently developed by revising two of the major concepts of operation for the site. First the proponent abandoned the single use notion for the site in favor of a mixed-use concept. The mixed-use concept provides at least three advantages. First, the mixed used concept provides for economically productive use of the entire property, which is essential to creating the income necessary to repair piers, bulkheads, and waterfront marine industrial facilities. In essence it provides a cross-subsidy arrangement for supporting marine industry with minimal use of public funds. Second, the mixed-use concept provides for synergism among project components. The various users can be clients, vendors and reference sources for each other, thereby enhancing the economic viability of the project overall. As examples, the marina provides a supply of potential customers for the ship repair operations at times when shipyard work is slow, and the

TABLE 3-1

SUMMARY OF USES PROPOSED AT THE BOSTON MARINE WORKS

Building No. (w/Gross Square Footage)	Boston Marine Works Proposed Use	Phase for Proposed Use (1) or (2)
ZONE 1		
• Barracks Bldg #16	4,972 sq. ft. Office	Phase 1
	10,286 sf Lt. Industrial/* Warehouse	"
• Immigration Bldg #18	8,688 sf Office	
	27,769 sf Lt Industrial/ Warehouse	"
• Woodworking Shop #17	9,660 sf Lt. Industrial	"
• Electrical Shop #11	6,400 sf Lt. Industrial	"
• Combination Bldg #14,15,24,34,35,363	5,488 Office	
	5,488 sf Lt. Industrial	"
	60,482 sf General Industry	"
ZONE 1 subTotal	139,233 sf	
ZONE 2		
• Gate House #21	740 sf Office	Phase 1
• Combination Bldg #22,23,33	10,894 sf Boat Sales/ Marine Rental	Phase 2
	19,964 sf General Industry	Phase 1
	100 seat restaurant	Phase 2
• Marine Service Area	208 slips Marine Service Area	"
ZONE 2 subTotal	31,598 sf 100 seat restaurant 208 slip marina	
ZONE 3		
• Administration Bldg #31	15,321 sf Office	Phase 1
• Machine Shop #32	20,598 sf Commercial	Phase 1
. Machine Shop #12	11,000 sf General Industry	Phase 1
ZONE 3 subTotal	45,581 sf	
TOTAL ZONES 1, 2, 3	217,952 sf 100 seats 208 slips	

USE SUMMARY

	OFFICE	RESTAURANT	BOAT SALES MARINE RETAIL	LT. INDUST. WAREHOUSE	GEN. INDUST. STORAGE/	TOTAL (SQ FT)
Phase 1	35,209 sf	-	-	59,603 sf	112,246	207,058
Phase 2		100 seats	10,894 sf - 208 slips			10,894 100 seats 208 slips
TOTAL	35,209	100 seats	10,894 208 slips	59,603	112,246	217,952 sf 100 seats 208 slips

* Includes 4,236 sf of food service.

Machine Shop user, CMT Machine Company, provides essential support services for the ship repair component while still maintaining its own client base. Third, and probably most interesting is that even within Zone 1, the marine-industrial area, the proponent has avoided the highly vulnerable single-operator shipyard use. The Cashman Marine Enterprises approach to ship repair at this site is equivalent to the role a general contractor plays in the construction process, i.e., employing management and engineering supervisory personnel and a nucleus of skilled tradesmen and then subcontracting the necessary sub-trades to separate on-site contractors such as sandblasters, painters, machinists, electronics professionals, etc. This approach can significantly reduce the costly overhead typical of the shipyard industry, while similarly preserving more stable employment.

Overall site development will be similar to a mall concept whereby the project will have major anchor tenants supported by a number of complimentary tenants. Among the anchor tenants will be the two Cashman subsidiaries: J.M. Cashman, Inc. marine contractors, the Cashman marine construction business with a proven track record, and Boston Graving Dock Corporation, the entity created by Cashman to operate the shipyard and dry dock facilities. The subsequent tenants will be independent marine service contractors. The marine industrial tenant mix is expected to include marine carpenters, marine machine shop service, marine electrical services and any number of other marine specialty contractors. By having the various independent contractors on-site, the large overhead of a single-operator shipyard will be avoided. Each contractor will be responsible for marketing and maintaining his own workload. This will mean that a single shipyard operator will not have to carry a large number of marine trade specialists through times when his yard is occupied by contracts with no need for some of the specialists on the payroll. This should lower not only overhead, but pricing for contract work making Boston Marine Works a more viable competitor for many types of shipyard work.

The proponent has been successful, to date, in attracting compatible marine trades tenants to the Boston Marine Works facility. Under the waiver for operations requested and granted during the ENF review process, the proponent has been marketing the facility and, to date, has attracted a machinist to operate the former machine shop, a sandblasting and painting company, a carpenter for marine cabinetry and woodwork, a marine electronics and refrigeration specialist, and a boat builder as well as a tow and tugboat company. These tenants have been available to provide support services for ship repair operations, while simultaneously servicing their existing clients and attracting additional work inside and outside the yard.

It is felt that this diversification of the functions of ship repair will allow Boston Graving Dock Corporation to sustain ship repair activity on a steady basis and meet the current and future industry needs at the Boston Marine Works throughout the lease period. The development of a marine service facility in the Pier 1 area at the site will attract some of the larger pleasure craft in Boston Harbor, as well as large transient and commercial vessels that presently cannot find adequate dockage facilities during the off-season months. These vessels will, in turn, also generate business for the proponent's tenants through demand for repair services. The synergy of these multiple tenant marine-related contractors will benefit from the market of an on-site deepwater marina.

The second major concept changed in the proponent's proposal is the target market for the shipyard. While Boston Marine Works tenants expect to compete for any contract work within their capabilities, the project as a whole will not depend exclusively upon large-vessel, large-contract work. Instead the shipyard, and the various independent contractors, will seek a balance of business that includes repair work for small to medium sized commercial vessels and large pleasure craft. The smaller commercial vessels targeted will include fishing vessels and commuter boats. The medium size vessels will be ferries, tug boats and other commercial vessels varying in length from about 100 feet to 300 feet. The pleasure craft business sought by the yard will consist mainly of the privately owned sail and power boats of 30 feet or more, typically twin-screw power boats of 10,000 pounds displacement or more. The target market has been modified for two reasons. First the number of smaller commercial boats and larger pleasure boats requiring maintenance and repair work is growing, while the large commercial vessel activity is dwindling in New England. Second the yard size and facilities limit the size of vessels that can be efficiently handled. In short, the target market has been modifed to meet the trends in the New England region's marine service demands.

To undertake its innovative plan, Cashman proposes implementing the Boston Marine Works project in two phases. Phase 1 is presently underway, as provided for by the MEPA waiver contained in the Final Record of Decision on the ENF issued March 30, 1987. The Phase 1 uses include:

- Offices for Cashman subsidiaries for J.M. Cashman Marine Contracting and The Boston Graving Dock Company;

- Waterfront docking and landside storage for J.M. Cashman, Inc. marine contracting equipment;

- Operation of the existing graving and floating drydocks.

- Leasing space to a variety of marine trades including sandblasting, painting, tugboat service, marine carpentry, machine shop and a boat builder.

Phase 2 will be implemented after the Secretary's approval of the Final EIR and issuance of other necessary approvals. The Phase 2 uses will include:

- Marine Services facilities for the off-season docking of commercial vessels.

- Recreational marina facilities consisting of floats, slips, electrical, water and sewage connections, fuel facilities, shower and restrooms.

- Public access areas/food service (100 seat restaurant).

- Retail boat sales.

- Boat storage.

- Marine supplies.

3.5 Zone 1 - Marine-Dependent Industrial Area

Zone 1 constitutes the core of the Boston Marine Works proposal. The major components of the zone are depicted in Figure 3-4. During Phase 1 of the project, Zone 1 is being rehabilitated to provide nearly 140,000 sf of marine-dependent space. The space will be served by the 120 parking spaces noted in the figure. At the same time, the ship repair facilities along the waterfront will be rehabilitated and reactivated. The zone will house both the ship repair activities to be undertaken directly by the proponent, and the complementary marine service activities to be operated by tenants of leased space in the zone.

Upon issuance of the MEPA waiver for proceeding with Phase 1 activities, the proponent initiated its effort to restore activity to the Boston Marine Works site. First, Cashman Marine Enterprises, Inc., the proponent's development arm, established its operations on-site. At first it operated from Building No. 31; more recently it established headquarters in Building No. 16. The development offices were opened with the objective of recruiting suitable marine services

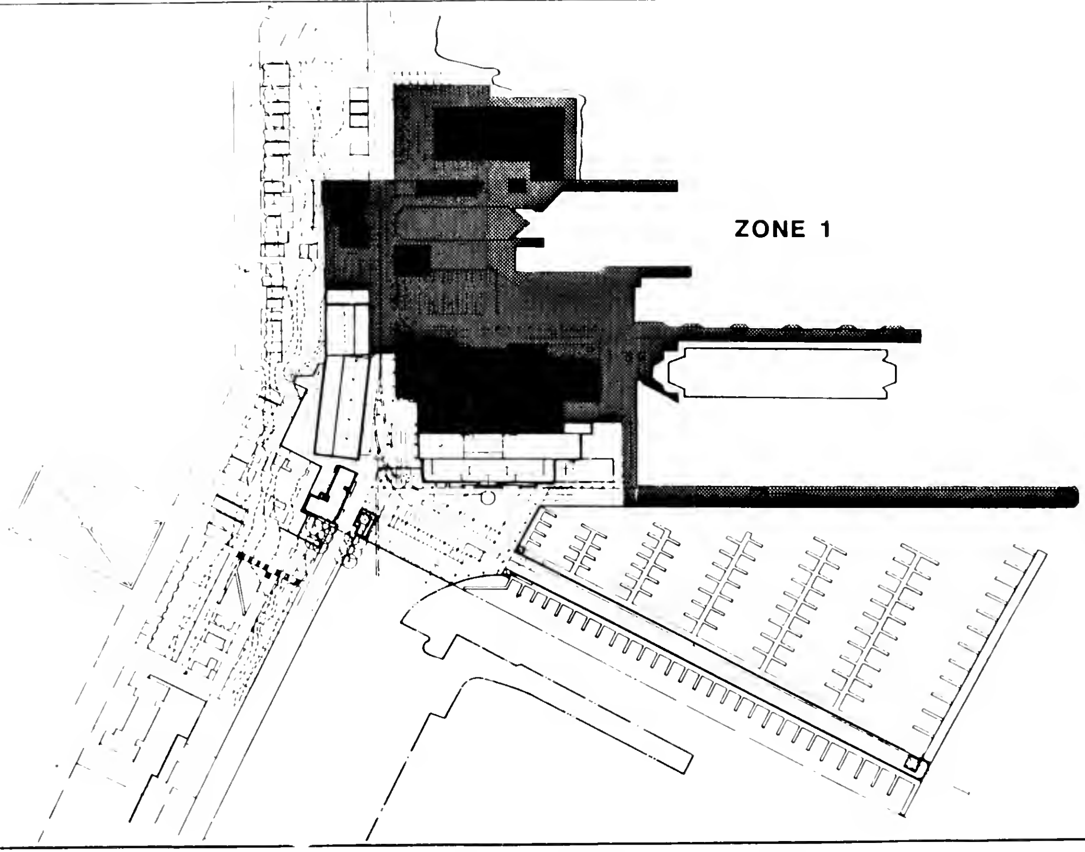


FIGURE 3.4 THE BOSTON MARINE WORKS

ZONE 1 - MARINE DEPENDENT INDUSTRIAL AREA

tenants to lease space at Boston Marine Works, with early emphasis on the activation of Zone 1. Simultaneously, the proponent's two marine industrial organizations commenced operations in Zone 1. The J.M. Cashman, Inc. marine contracting business began transferring much of its yard operation from the Weymouth facilities, being phased out, to the Boston Marine Works. At the same time, the Boston Graving Dock Corporation, which the proponent created to operate the waterfront ship repair facilities, commenced operations. These two entities operate from the Combination Building, where they occupy 28,810 sf of industrial space in Building Nos. 15 and 35; management and administrative personnel share another 2,000 sf of office space, with the Cashman Marine Enterprises, Inc. personnel in Building No. 16. The proponent's three business organizations employ about 30-40 people at the site.

The major waterfront components of Zone 1 include Piers 2, 3, 4 and 5, where potable water, fire protection, waste disposal, steam, electrical service and gantry crane service are available. The 256-foot graving dock is operating now. It can accommodate vessels of up to 16,500 long tons. The 622-foot floating dry dock, which was in such poor condition that it sank, has been repaired and restored to operational condition. While it has not yet been used, it could be. The proponent has not yet decided whether it will use the dry dock, or replace it with a newer, smaller, more cost effective hauling system more directly designed for use with the smaller vessels that make up the new target market. In either event, these facilities provide dry dock and haulage capability for hull repairs, topside repairs, fabricating, welding, scraping, sandblasting, spray painting, and engine, shaft and prop maintenance services for vessels up to 600 feet long. These, combined with other facilities on-site, make the Boston Marine Works ideally suited to performing repairs, refitting and maintenance work. The Boston Marine Works will also provide inspectional services for the small and medium sized commercial vessels and larger pleasure craft in the Boston Harbor area and, in some cases, for other customers in the New England region.

Using these facilities, the proponent's employees are already actively engaged in ship repair services. The proponent also uses the Zone 1 piers and buildings to support its marine construction activities. Between jobs, the proponents may dock, store or repair its construction equipment (e.g., trucks, barges, cranes, scars and pile drivers). While the operation of the marine contracting equipment will occur primarily at off-site job locations, the equipment stored at the site between jobs might typically include two barges, a dump scow, a tugboat and two cranes. For this storage, Cashman vessels, and other commercial craft, will generally use Pier 3, the east side of Pier 2, and the 3.4 acres of water area between them for dockage.

Because the proponent's marine contracting business and the graving dry dock ship repair services use only a fraction of the yard's facilities, the Boston Marine Works concept entails providing leased space and equipment for other marine-related users throughout the rest of Zone 1. The space available for other tenants includes the following:

- The remainder of the Combination Building (Building Nos. 14, 24, 34, and 36) -- The Combination Building provides space for 5,488 sf of office uses and 5,488 sf of light industrial/warehouse space within Building No. 36; it provides 11, 628 sf of industrial space within Building No. 14; it provides 20,044 sf of industrial space within Building Nos. 24 and 34. Cashman Marine Enterprises is in the process of marketing this space to suitable marine service businesses.

- The Barracks Building (Building No. 16) will be renovated to house 4,972 sf of office space (2,000 sf to be occupied by the proponent), 6,050 sf of warehouse loft space, and 4,236 sf of food service. The latter operation has the potential to supply the harbor cruise ships operating in Boston Harbor.

- The Immigration Building (Building No. 17), an existing 36,457 sf storage area, will be renovated to provide 27,769 sf light industrial or commercial warehouse uses, and 8,688 sf of office space.

- The Woodworking and Paint Shop (Building No. 18), will include 9,660 sf to be leased, with its equipment, for light industrial shop space.

3.6 Zone 2 - Marine-Dependent Marine Services Area

During Phase 2 approximately 10.6 acres of land and water at the Boston Marine Works will be developed as a commercial/recreational marine services complex. During the late spring, summer and early fall months, this facility will be used primarily as a recreational marina. During the six-month "off-season" for recreational boaters, the marina will be modified to provide dockage space for smaller commercial vessels after the "summertime" Boston Harbor operations have concluded. Developing the marine services area (as shown in Figure 3-5) entails rehabilitating Pier 1, and the portion of the Combination Building (Building Nos. 22, 23, and 33) located within the zone. In addition, Zone 2 redevelopment includes building a floating breakwater, new gangways and finger piers for marina slips, and developing the landside activities necessary to support a large active marine service area.

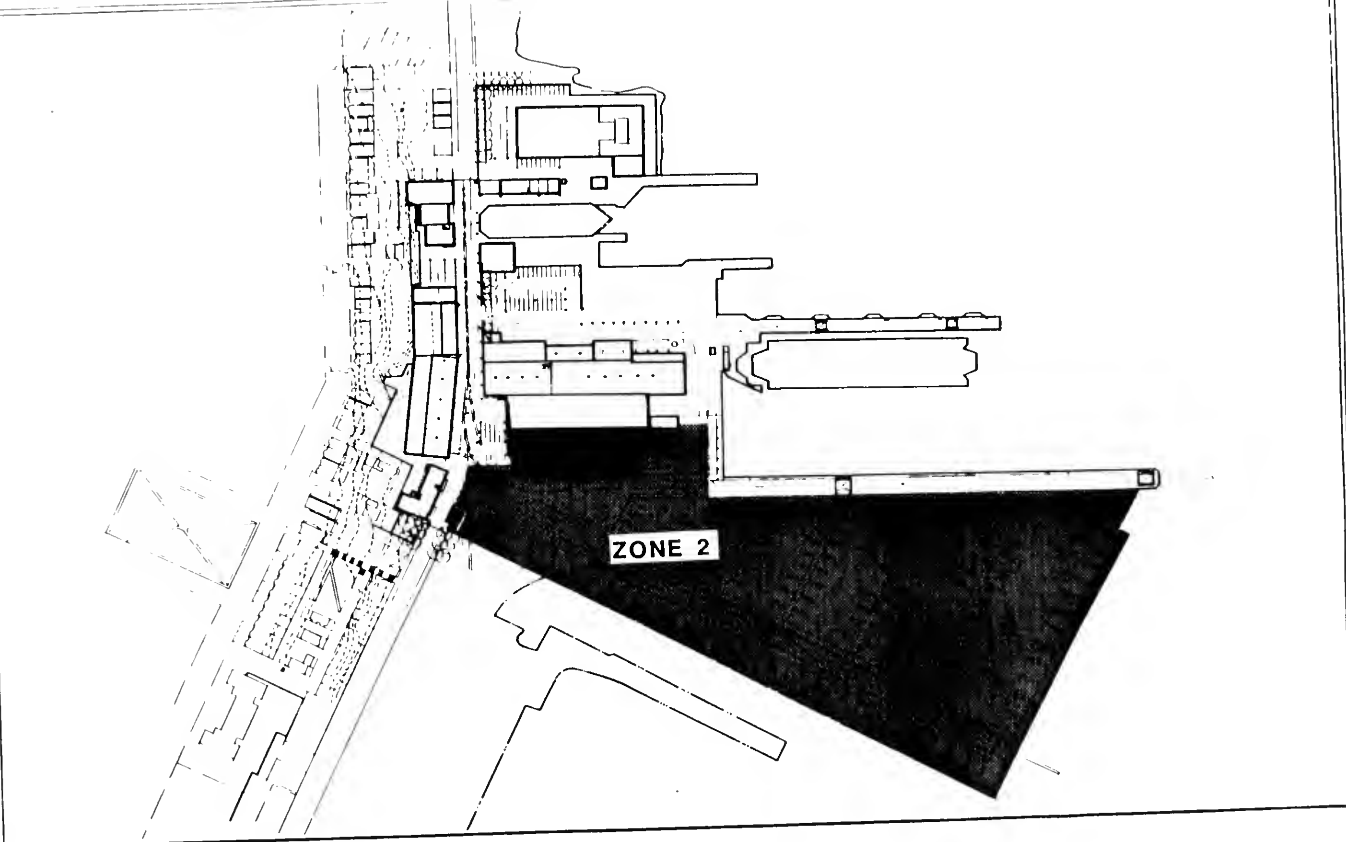


FIGURE 3.5 THE BOSTON MARINE WORKS

ZONE 2 - MARINE -DEPENDENT MARINE SERVICES AREA

To construct the marine services area marina layout as shown in Figure 3-6, the proponent must first restore Pier 1. In addition, if the floating drydock presently moored at Pier 2 is moved to Pier 3, wave slats will be attached to Pier 2 to form a wave screen and provide wave and wake protection. After performing the pier work, the proponent must build a floating breakwater to create a protected marine basin of 5.8± acres between Piers 1 and 2. The floating breakwater will extend from the tip of Pier 1 toward Pier 2, have a length of about 440 feet, a width of about 20 feet and will be secured with a chain and anchor system. An 80-foot wide channel into the basin will be preserved along the west side of Pier 2 to provide safe access.

The design proposed for use at the Boston Marine Works is based on a site engineering analysis and a design development study performed by the proponent's marine engineer. The results of the wake impact evaluation portion of that study concluded that, while it is not feasible to completely eliminate wave action in the Zone 2 marine services area, the proposed protection will work effectively. The system is designed to reduce incident wave and wake heights generated by typical Boston Harbor vessel traffic in the shipping channel as well as in the 1,200 foot zone separating the channel from the site. Under most circumstances, the wave or wake will be reduced to less than 50% of its incident height within the embayment between Piers 1 and 2 and within the "shadow" area to the east of Pier 1. This means that most of the time the wave within Zone 2 will be less than one foot in height. This degree of protection is acceptable for the site location and will be enhanced by mooring the larger vessels nearest to the channel, thus providing additional sheltering to smaller boats inside. The floating breakwater is a proven technology that has been widely utilized in Europe and North America to provide wave and wake protection for marinas. Several pile-held float systems have recently been used in the Boston Harbor area to provide similar protection, but provide a lower level of performance.

Inside the basin, and along the west side of Pier 1 (1.7± acres of water area), the slips will be created by constructing a system of removable gangways and finger piers. This layout will permit docking of 168 boats within the basin, and docking of 40 boats along the west side of Pier 1. Water access to these forty slips will be provided by a channel along the western property line. This channel will be shared with any future site use at Massport's East Boston Pier 5.

The recreational marina will now accommodate 208 boats, with a fleetmix ranging in size from 20 feet to over 55 feet in length. The fleetmix is shown in Table 3-2.

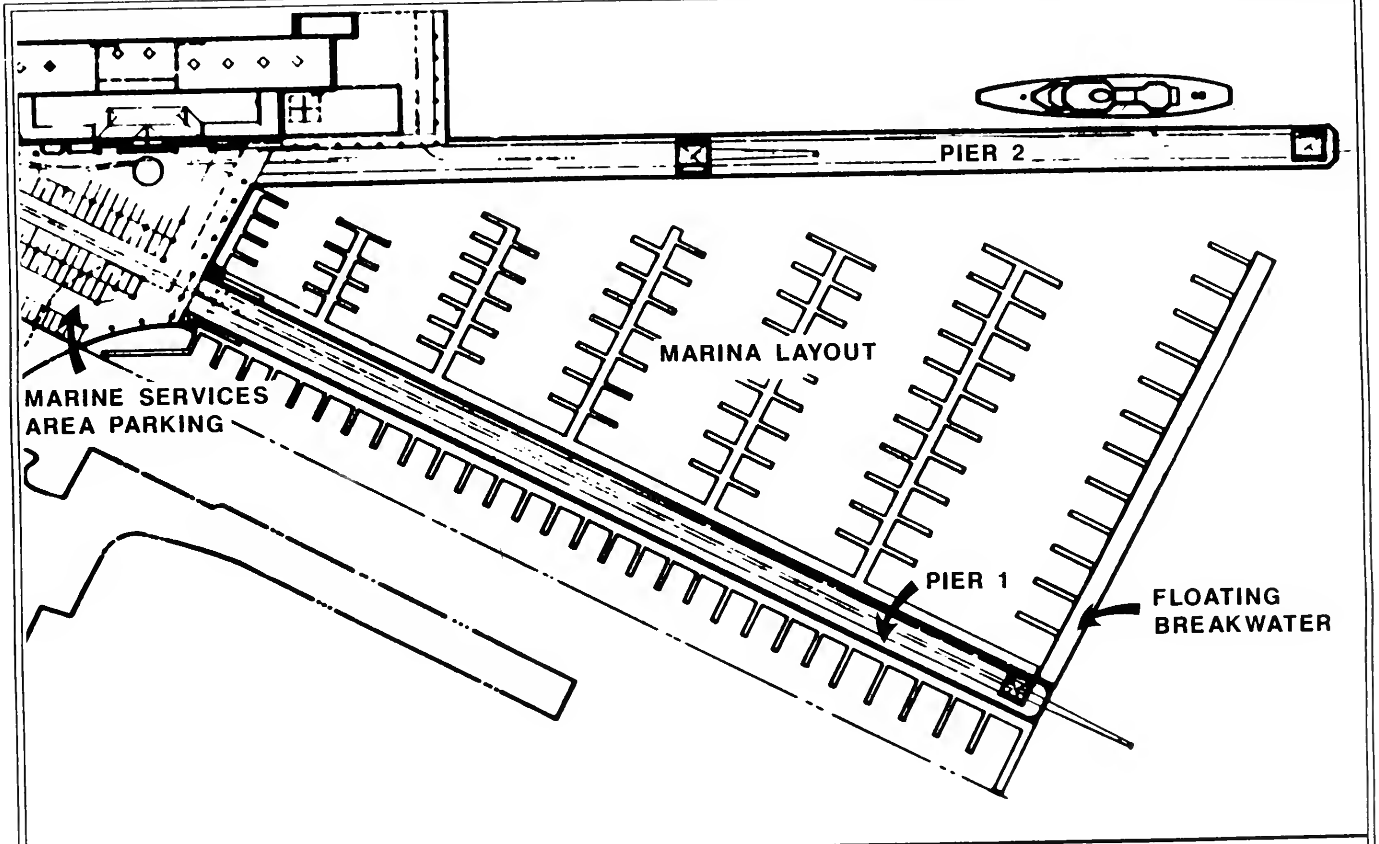


FIGURE 3.6 MARINA LAYOUT

TABLE 3-2

FLEETMIX FOR THE BOSTON MARINE WORKS MARINA

Boat Length Over All (LOA) Range in Feet	Number Of Boats	% of Total
20' to 30'	31	14.9%
30' to 35'	59	28.4%
35' to 45'	73	35.1%
45' to 55'	29	13.9%
> 55'	16	7.7%
TOTAL	208*	100.0%

* Slip usage.

Note: Of the 208 slips - 10% will be dedicated to transient boats and vacant slips will be available on a daily basis for transient activity.

Originally, the proponent had proposed a recreational marina with 240 slips, the limit allowed by its lease with Massport. Since the Draft EIR was published, however, the number of slips has been reduced, while the median slip size has increased. This change was made on the premise that larger boats will provide more business for the ship repair operations than a greater number of smaller boats.

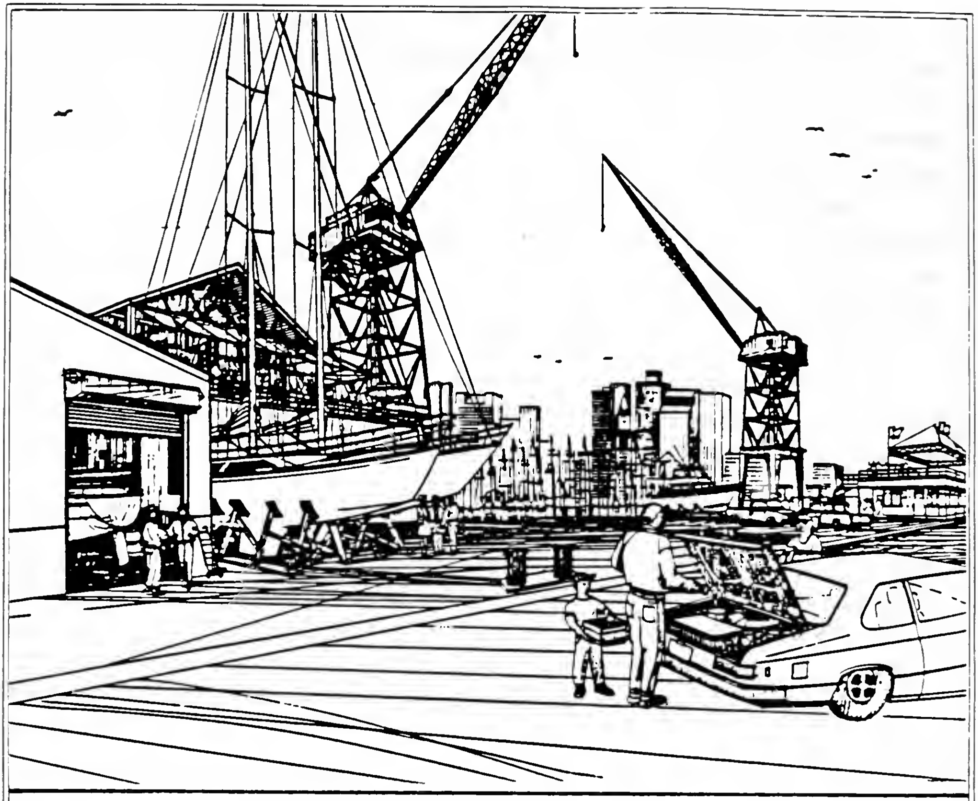
Tie-up for at least one large vessel, such as a "tall ship", will be accommodated on the seaward side of the breakwater. In addition, the marina layout is such that larger boats will be docked on the slips on the landward side of the floating breakwater. These vessel placements should serve to augment the wave and wake attenuation of the breakwater.

Pier 1 will be improved with new decking to provide both limited vehicular (drop off) access for marina patrons, and public pedestrian access. To accommodate public access, the proponent will provide guard rail, street furniture, and ample lighting at gangway locations. The pier itself will be separated from access to the slips by a fence and gate system at the gangway entrances.

The base of the pier (i.e., the landward end) will be the focal point for services. Gas and diesel fuel will be dispensed from this location. Fuel will be pumped from three 8,000 gallon fiberglass tanks to be placed beneath the paved parking area for Zone 2. Likewise, water and ice service will be provided at the base of the pier. In addition, holding tank pump-out facilities and a tender dock will be located here.

The proponent also plans to construct a water-taxi terminal as part of the Boston Marine Works proposal. Access to the water-taxi will be via a floating dock at either the base or the seaward tip of Pier 1. The proponent is in the early stages of planning for water-taxi service. The planning effort consists of exploring the feasibility of a multi-stop system with other waterfront operators and initial talks with potential water taxi service operators. While it is premature to commit to specific service schedules, the proponent is committed to providing the on-site terminus necessary to support any future demand for water-taxi operations that can be coordinated with other sites.

The marina configuration within and along the two permanent piers will be provided by placing the system of gangways and finger piers. This floating system will be constructed of steel and timber. The finger pier slip design has been chosen largely because it is a flexible design that will work well within this sheltered embayment. At any future time, the gangways and finger piers may be removed if the proponent finds that its shipyard activities require expanded access to this area presently programmed for commercial/recreational marina usage.



BY DAVID GALLER ASSOCIATES,INC. ARCHITECTS

FIGURE 3.7 PERSPECTIVE OF MARINA LOOKING TOWARDS DOWNTOWN BOSTON

During the winter months the proponent will remove finger slips from some portion of the marina. The removal of finger slips will enable the marina to provide dockage for up to 16 small commercial vessels from 50 to 100 feet in length. The availability of this dockage will provide a sheltered location from which the owners, operators and crews of the smaller commercial vessels can undertake crew-performed winter maintenance and repairs. The location of this dockage, adjacent to the shipyard and marine service activities is likely to prove popular with the vessel owners, will contribute to marine space rental income, and to marine industrial service demand for Boston Marine Works tenants. To accommodate commercial vessels during the winter off-season, it is anticipated that:

- Some recreational vessels will be removed and kept on-site for maintenance and repairs.

- Smaller boats will be transferred to owner-designated off-site storage.

- Larger deep-water vessels will travel south to warmer waters for the winter months.

- Remaining in-water vessels will be consolidated freeing space at the outer gangway areas.

Both the recreational use of the marina and the winter usage of the marina by commercial vessels depend upon restoration of Pier 1 which has deteriorated badly.

The concerns regarding conflicts between recreational boating and commercial vessels within the harbor have been evaluated from the overall perspective of the entire resource area. Potential navigational hazards to maritime shipping interests from the increase of recreational boat traffic is an issue which can be dealt with by appropriate planning.

In the case of the proposed operations at the Boston Marine Works, seasonal recreational boat traffic will use non-channel areas for ingress and egress within the immediate harbor area. There is more than 1,200 feet separation from the proposed marine services area to the main shipping channel for safe passage of both large vessels and recreational boats. The proposed marina, as a deepwater facility, is focusing on larger pleasure vessels whose masters will have more professional skills in navigation and seamanship. If the situation warrants, additional aids to navigation can be provided to guide recreational boating out of conflicts with larger vessels

using the main channel. The Boston Marine Works marina is located in a geographically advantageous position on Boston Harbor; adjacent to an extensive deepwater area, close to the entrance of the main channel into the outer harbor, and in a position that physically will cause the least impact on navigation compared to other marina operations in more restricted areas.

There are also several landside components of Zone 2. First, the marina activities will be accommodated by improvements to the Gate House and Pier 1. The 740 sf Gate House has been renovated as a multi-purpose building. Security for the entire site is being implemented from this structure. At the same time, the administrative offices of the marina will be established here. Lastly, the roof of the Gate House has been modified to serve as an observation deck. In Phase 2, this deck will be geared to the public views of the Boston Marine Works, in general, and of Zone 2 with its marina, waterfront and panorama of the Boston skyline which can be enjoyed from this vantage point. This deck, together with Pier 1, will enable the public to have access to a site that was not previously available.

Zone 2 improvements include new uses for a portion of the Combination Building (Building Nos. 22, 23, and 33). The proponent envisions placing the marina restrooms and showers in a portion of Building No. 22. The remainder of that building, some 10,894 sf, is programmed to be leased as boat sales and marina retail sales space compatible with operation of the marina. The Zone 2 concept also includes building a 100-seat restaurant on the roof deck above Building No. 22. The small restaurant would serve Zone 1 and Zone 3 employees, as well as accommodate the marina patrons and the public. It is also likely that such a small eatery, being the only waterfront restaurant in East Boston, would quickly become a de facto extension of the public accessway to be provided on Pier 1 and on the Gate House deck.

The remainder of the Zone 2 space is provided in Building Nos. 23 and 33. These buildings provide 19,964 sf of industrial space. The proponent hopes to find tenants with boat storage operations to fill this space. Target tenants include boat building and repair activities.

Zone 2 includes 1.6 acres of existing upland area, other than the buildings previously described. Most of this land will be used to provide 122 parking spaces within the zone. Land area not used for parking will likely be used for seasonal outdoor boat storage. The 122 spaces in the zone will be shared with the 72 spaces in Zone 2 3. The Zone 3 spaces will be used by marina patrons during peak marina times (summer evenings and weekends); the Zone 2 spaces will be used by Zone 3 employees during off-hours for the marina.

3.7 Zone 3 - Office and Industrial Area

This is the smallest of the three zones that comprise the Boston Marine Works property. It consists of 1.8 acres with three buildings, two of which (Nos. 12 and 32) are connected. The Zone is shown in Figure 3-8. All Zone 3 activity is scheduled for Phase 1. This component of the project will entail renovating existing offices in Building No. 31 to provide 15,321 sf of new office space, renovating the existing machine shop in Building No. 12 to provide a viable machine shop operation with 11,000 sf of floor space, and renovating Building No. 32 to provide 20,800 sf of commercial uses. These buildings are located north of Marginal Street on the site in an area that is filled upland. Reserved parking for 72 cars will be provided. These spaces presently serve as parking for Buildings 13, 31, and 32. In addition, the 122 parking spaces allocated for the marine services area will be shared during the week to serve the office needs when that parking is under-utilized.

The rehabilitation and operation of all existing buildings will be carried out in a manner that serves the existing and future needs of the Port of Boston. This will be done in a manner that does not pre-empt Massport's option to return the entire site to a large scale ship repair facility once the proponent's lease has expired.

3.8 Project Timetable/Construction Schedule

The project timetable is shown in Table 3-3 and the schedule of improvements is outlined in Table 3-4.

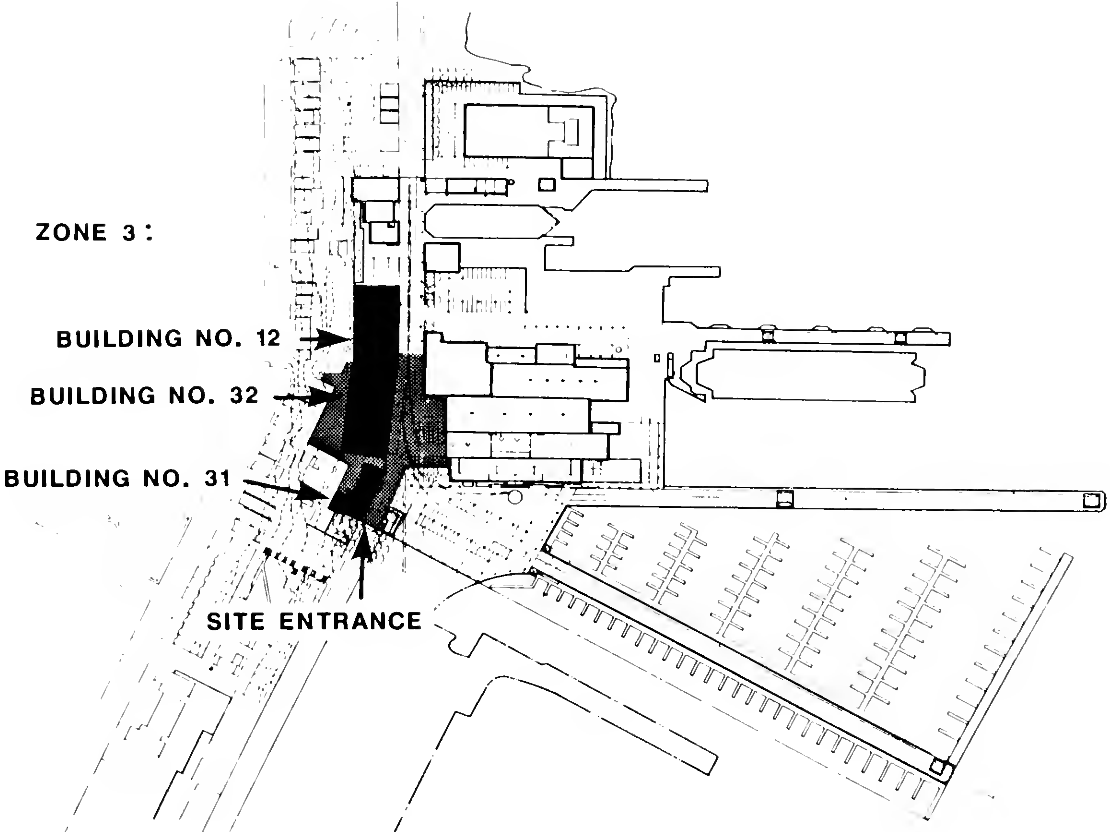


FIGURE 3.8 THE BOSTON MARINE WORKS
ZONE 3 OFFICE & INDUSTRIAL AREAS

TABLE 3-3

PROJECT TIMETABLE

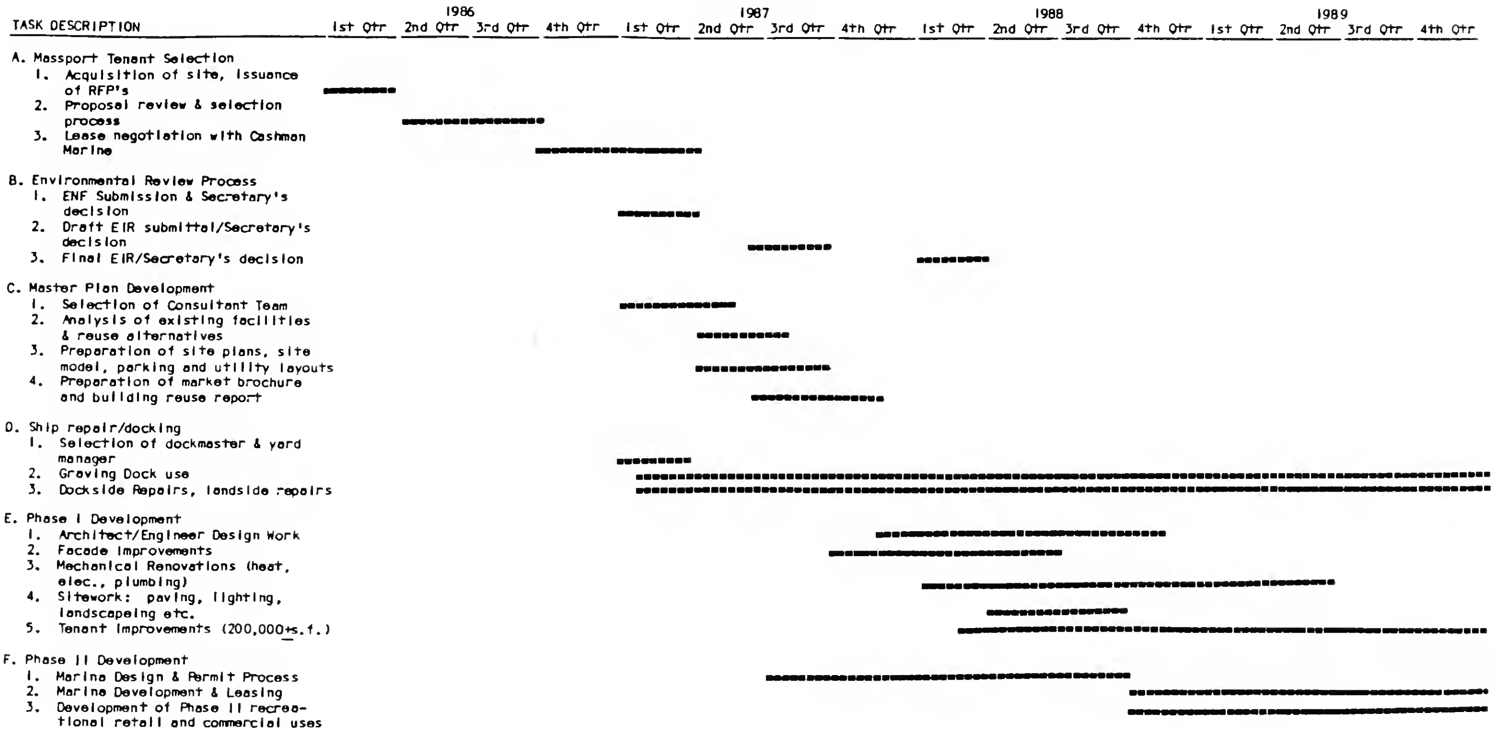


TABLE 3-4

SCHEDULE OF IMPROVEMENTS

BUILDING NUMBER (PAST USE/NAME)	INTENDEND USE	CONSTRUCTION CATEGORIES: MASONRY & REPOINTING	ROOFING REPLACEMENT OR REPAIR	WINDOW REPLACEMENT OR REPAIR	NEW HEATING SYSTEM	NEW ELECTRICAL SERVICE	NEW INTERIOR PARTITIONS & FLOORING	NEW PLUMBING FIXTURES
11. (ELECTRICAL SHOP)	SMALL MARINE USER	X	X	X	X	X	X	X
12. (MACHINE SHOP EAST)	MACHINE SHOP			X	X	X		X
13. (RIGGERS BUILDING)	SMALL MARINE/ SHIP REPAIR TENANT	X	X		X	X		X
14. (LOCKER ROOM)	SMALL MARINE/ SHIP REPAIR TENANT	X	X		X	X		X
15. (EAST BAY-COMB. BUILDING)	WORK SHOP BOSTON GRAVING DOCK	X	X					
16. (BARRACKS BUILDING)	OFFICES, FOOD SERVICE, MARINE RELATED USERS		X	X	X	X	X	X
17. (CARPENTER SHOP)	INDEPENDENT MARINE USER	X	X	X	X	X		
18. (IMMIGRATION BUILDING)	LARGE MARINE RELATED USER		X	X	X	X	X	X
21. (GATEHOUSE)	MARKET OFFICE, PEDESTRIAN VIEWING DECK	X		X	X	X	X	X
22. (POWERHOUSE)	MARINE RETAIL, RESTAURANT		X	X	X	X	X	X
23. (PIPE & COPPER SHOP)	MARINE INDUSTRIAL STORAGE	X	X		X	X		X
24. (WEST BAY-COMB. BUILDING)	MARINE INDUSTRIAL STORAGE		X			X		X
31. (ADMINISTRATION BUILDING)	OFFICES		X	X	X	X	X	X
32. (MACHINE SHOP WEST)	MARINE INDUSTRIAL OR RETAIL (BOAT SALES)		X	X	X	X		X
33. (SHEET METAL) (SHOP)	MARINE INDUSTRIAL OR COMMERCIAL		X		X	X		X
34. (WEST BAY-COMB. BUILDING)	MARINE INDUSTRIAL OR COMMERCIAL		X					
35. (EAST BAY-COMB. BUILDING)	J.M. CASHMAN SHOP	X	X			X		X
36. (EAST BAY OFFICES	OFFICES FOR MARINE TENANTS	X	X	X	X	X	X	X

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SECTION 4

4.0 ALTERNATIVES TO THE PROPOSED PROJECT

This section provides a description of the three alternatives that have been investigated. The project as revised and described in Section 3.0 is Alternative 1, the Preferred Alternative of the proponent. The option of not proceeding with the project is considered as Alternative 2, the No-Build Alternative, that must be studied according to MEPA requirement. Alternative 3 is the expansion of shipyard activities. The consideration of this third alternative is undertaken in response to comments on the Draft EIR.

4.1 Alternative No. 2 - No-Build

The No-Build Alternative has been addressed as required to establish future baseline conditions. The conclusion of such an evaluation is that No-Build is not a desirable alternative from the waterfront, access, economic, and environmental perspectives. No-Build would result in the continued abandonment of Massport's East Boston Shipyard facilities at a cost to Massport of $1,000,000 per year debt service, plus the costs for clean-up and security. The No-Build alternative is also a case of lost opportunities. The Port of Boston would be deprived of the use of a shipyard facility with a graving dry dock to effectively service the fleet of commercial passenger vessels and other local vessels that must be removed from the water for U.S. Coast Guard supervised inspections and maintenance. These vessels for which down-time is a critical issue would be forced to seek a servicing facility outside the Port of Boston, as they have for the past 1-1/2 years while the yard was closed. Needed waterfront improvements to bulkheads, piles, decking and equipment would not be affordable, and any future marine-dependent industrial use would have to invest considerably more time and money to offset the further deterioration to the waterfront.

As a full shipyard facility, there has never been public access to the site. The No-Build alternative would continue to exclude the East Boston community, and the general public, from this important section of the Boston Harbor waterfront. Similarly, the adoption of the No-Build Alternative would result in the loss of necessary funding to pay for the needed physical improvements at the shipyard. Failure to make needed improvements at this time will result in further degradation and decay to site facilities and increased likelihood that this area could not be rehabilitated and reused in the future without a major commitment of time and financial resources. Finally, under the No-Build Alternative, East Boston residents qualified for Boston Marine Works employment, who are currently unemployed or under-employed, would lose the opportunity to be hired at this facility and site-related jobs would not be brought into the community.

Alternatives 1 and 2 are the two major alternatives addressed in Section 6.0 of this Final EIR. For each of these alternatives, six site use issues have been addressed in detail. These are the potential for impacts associated with:

- Marine-Related Uses
- Hazardous Materials
- Sewer
- Stormwater Runoff
- Traffic/Transportation and Parking
- Public Access

4.2 Alternative No. 3 - Expanded Shipyard Use

The MEPA Unit has also asked the proponent to examine another alternative. In the Final Record of Decision issued by MEPA, it was requested that the potential for expanded ship repair operations be assessed as an alternative to the Phase 2 marina complex use proposed in the Draft EIR. Since submission of the ENF and receipt of the Phase 1 waiver and initiation of operations, Cashman has met with some success in attracting marine-dependent industrial users to the Zone 1, the Marine-Dependent Industrial Use Zone. This success is reflected in the increased level of site use now proposed in this Final EIR for marine-dependent industrial purposes over the level originally proposed. However, the present and projected need for actual ship repair uses does not reach a level that would economically justify the expansion of these services into the area between Piers 1 and 2. The space is not needed for shipyard use, nor would its dedication to shipyard activity increase the level of shipyard work.

The former shipyard operation is a specific indication of the depressed nature of the industry, and of the limitations of the site for intensive ship repair activities. As previously noted, the Marginal Street piers have been the site of shipbuilding and repair since the early 1800's when they were operated by the Simpson Dry Dock Company. Bethlehem Steel Corporation took over operations during the 1920's and at times employed upwards of 900 men on multiple shifts. But in 1982, faced with a continuing decline in government and commercial maritime work and the competition of larger, more accessible, modern facilities, Bethlehem Steel ceased operations and closed the facility.

The shipyard was acquired from Bethlehem Steel in June of 1983 for just over $2.1 million dollars by local interests operating under the name of Boston Shipyard Corporation. That new management, aided by an infusion of private financing and low interest government loans, was intent on once again making the shipyard competitive in the ship repair business. However, Boston Shipyard Corporation's plans for the facility were short-lived. By October 1985, only 28 months after the acquisition of the yard, most, if not all 400 workers at the facility were laid off and the corporation was in receivership under Chapter 11 provisions of U.S. Bankruptcy Court.

In December of 1985, when Boston Shipyard Corporation submitted a reorganization plan to the U.S. Bankruptcy Judge, their classification of claims, debts and interests were broken into six categories including:

1)	Priority Claims	$1,200,000
2)	Claims of Shawmut Bank	$3,500,000
3)	Public Agency Lenders	$3,500,000
4)	Secured Stockholder Guarantors	$1,200,000
5)	Tax Claims	
	IRS	$1,070,000
	Commonwealth of Massachusetts	$ 200,000
	DES	$ 100,000
6)	General Unsecured Creditors	$4,400,000

The total of all these claims to the Boston Shipyard Corporation from only 2-1/3 years of operations was $15,170,000.00, over 7 times the acquisition price for the facility.

The indebtedness incurred by Boston Shipyard Corporation is elaborated upon here not to belabor the difficulties incurred by the predecessors to Boston Marine Works, but to underscore the extremely bleak outlook for a large scale ship repair facility at this site at the present time and for the foreseeable future. For a multitude of reasons including: high labor costs, declining contracts, constraints of climate, poor highway access, excessive overhead, outdated and obsolete equipment, slow payment collection, etc., Boston Shipyard Corporation was unable to continue operation of this shipyard in the traditional manner and sustain an economically viable, full scale shipyard and commercial docking facility at this site.

In looking at the national trends in the ship repair market, a report* prepared by the Maritime Administration in compliance with the Merchant Marine Act of 1936, has been reviewed. The report is an annual survey to obtain information from the U.S. shipbuilding and ship repair industry. The most recent edition of the report notes that presently there is a continuing worldwide shipping recession,** uncertain near-term future prospects, and, since 1970, declining commercial orders and ship building employment. Despite this slump in commercial and military ship construction, there has been an increased emphasis on the expansion of ship repair, overhaul and conversion facilities. The report does not consider the Boston Marine Works to be large enough a facility to be engaged in this type of major ship repair. Cashman Marine Enterprises' Phase 1 plan is to provide hull and topside ship repair, overhaul and conversion capabilities for small to intermediate sized commercial vessels in the Boston Harbor area and provide a base for the proponent's marine contracting business. The Phase 2 plan provides for developing Commercial/Recreational Marine Service uses and ancillary services in Zone 2. Although the ship repair operation is a much needed support service for the growing number of excursion, commuter and fishing boats in Boston Harbor, the business is cyclical in nature and has a low profit margin. There is a more competitive market for services on these smaller vessels so, at this time, the market demand will not sustain a greater level of commitment.

It is the proponent's opinion that such an expansion to replace the need for recreational marina use is not justified by present or anticipated market demand or by the economic viability of this alternative. Furthermore, the presence of a deepwater commercial/recreational marine services zone will create a need for marine support business such as diesel engine repair, marine electronics, marine carpentry, marine refrigeration and related services which will similarly provide support to the ship repair operations on-site.

One of the commenters to the Draft EIR was interested in seeing a full inventory of commercial vessels in the harbor that might provide work for a shipyard, as well as questioning why Boston has not always retained its "natural" business in ship repair work. The best source of vessel identification and classification is the U.S. Coast Guard, which is the certifying agency for navigation safety compliance. The local Boston Coast Guard office is responsible for certification of vessels in the coastal region from New Hampshire to Rhode Island.

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* 1986 U.S. Department, Maritime Administration Report on Survey of U.S. Shipbuilding and Repair Facilities.

** See Appendix E for related articles on ship building trends.

They classify vessels into different categories including: ships over 100 gross tons; tank ships; barges; and passenger vessels under 100 gross tons. There are 115 passenger vessels under 100 gross tons (GT) in the Boston Coast Guard Region and 13 American and 3 Canadian vessels in the larger categories as itemized below:

Ships Over 100 Gross Tons (GT), Tank Ships and Barges, in the Boston Coast Guard Region
(Weight in Gross Tons)

Farrell 200 Freight Barge	1,250
Dieselblue Tank Ship	35
Captain Dave Tank ship	43
B.F.T. #39 Tank Barge	2,432
Shelia O'Hara II Tank Barge	69
American 21 Tank Barge	1,262
Irving Seal-Canadian Tank Barge	
Irving Sea Lion-Canadian Tank Barge	
Irving Dolphin-Canadian Tank Barge	
Crystal D Tank Barge	210
Bert Reinauer II Tank Ship	1,597
B No. 95 Tank Barge	5,566
Esther Moran Towboat/Tugboat	426
B No. 115 Tank Barge	6,411
New England 29 Tank Barge	1,634
B.F.T. No. 38 Tank Barge	2,432

The vessels listed above, and the passenger vessels over 100 gross tons require periodic dockside, as well as dry dock, inspections and certifications from the Coast Guard regional office. Dockside certificate of inspections are performed every two (2) years for vessels over 100 gross tons (tank ships and barges), whereas smaller passenger vessels receive dockside certificates over 1-3 year intervals. The large vessel category requires drydock/landside inspections from the Coast Guard every two years, whereas the "smaller" vessels are drydock/landside inspected every 18 months. During the last 12 months, 50 vessels under 100 GT have received the latter Coast Guard certification in the Boston Region, and six of the "larger" vessels were certified.

The Coast Guard certifications are performed to document the sea worthiness of vessels and much of the repair work on ships, barges, tugs, commuter boats, etc., is performed to comply with these regulations. There is a significant amount of regional competition for this work. Also, some work is lost to areas such as Norfolk, Virginia and other equally distant ports based on the vessel's "home port" certification, or as a result of cheaper labor rates in less economicaly prosperous areas. The local/regional competition with the Boston Marine Works for ship repair and Coast Guard certification work comes from among the following yards:

- General Ship, Boston;
- Falmouth Marine (100 ton travel lift);
- Gloucester Marine Railway;
- Fairhaven Marine (150 ton railway);
- Rockland Marine (travel lifts up to 200 tons);
- Newport Off Shore, Newport, RI;
- Derektor's Shipyard, Portsmouth, RI;
- Rowes Machine, Gloucester;
- Belle-Isle, Winthrop;
- Tucker's, Marblehead; and
- Harbor Marine Services, Charlestown.

These facilities range from boat yards with travel lifts or marine railways to full scale shipyards with graving docks and drydocks. Nevertheless, they represent a significant cross-section of service facilities for an industry with a rather limited supply of work. Furthermore, the maritime industry is one where a majority of owners/operators of vessels provide top-side and routine service repairs with their own personnel. By designating the basin within piers 1 and 2 as a "marine services zone" with a floating breakwater, the Boston Marine Works will be able to accommodate those commercial vessel operators from November to April who wish to dock over the off-season and perform their own repairs.

The best documentation of the difficult economics of the ship repair industry and its potential for further expansion within the Boston Marine Works master plan can be understood through analyzing the income of the first 8 months of operation of Boston Graving Dock Corp. at the Boston Marine Works under the Phase 1 waiver. This information is outlined below:

Income, Boston Graving Dock Corp. - 1987 Operations (245 Days)

Source of Work	Total # of Vessels Serviced	Duration of Use (Total # of Days)	Gross Revenue Generated
A. Graving Dock	9	110 days	$306,000.
B. #1 Drydock	4	90 days	$260,000.
C. Pierside	12	75 days	$190,000.
D. Pipe Fabrication, Steel Fabrication, and "Yard" Work	N/A	105 days	$83,000.
TOTALS	25 vessels	200 days dock time 180 days dockside & yard	$839,000.

Based upon the 8-month gross revenue calculation of $839,000 received from ship repair operations by Boston Graving Dock Corporation in 1987 (May - December), the costs and profit/loss are broken down as follows:

A.	GROSS REVENUES 1987:		$839,000.
B.	EXPENSES		
	a) Payroll	$525,000.	
	b) Supplies & Materials	200,000.	
	c) Rent to Massport	75,000.	
	d) Utility Costs	102,400.	
	e) Repairs & Replacement	150,000.	
	TOTAL		$1,052,400.
C.	PROFIT/LOSS (A-B)		-213,400.

Although the first year of operations represented a net loss of over $200,000, part of this loss was a result of business start-up costs. A large portion of the loss represented money spent on extensive repairs for Drydock No. 1. Also, the utilities are now being more closely analyzed and it is hoped that "peak charge" electric fees can be reduced in the future. Nevertheless, the ship repair business at this site in the near term is, at best, a break-even venture, and the revenues generated by expanding this would not provide sufficient income to fund the long overdue repairs needed by the facility's buildings, grounds, piers and docks.

Due to the bleak forecast for the ship repair industry on a national and regional basis, the competition from the area yards for the limited available work, and the proponent's actual experience at the facility during the past year, Alternative 3 is not offered as a feasible alternative to the development of a marine services zone between piers 1 and 2 at the Boston Marine Works.

SECTION 5

5.0 EXISTING ENVIRONMENT

This section provides a brief overview of the existing physical and demographic conditions pertinent to the site. It describes the site surroundings and the region in sufficient detail to provide a baseline for assessment of potential impacts.

5.1 The Site and Its Characteristics

The Boston Marine Works site is 34.3± acres of developed land and water located on the northeast side of the Boston Inner Harbor in East Boston, Massachusetts. The landside portion of the site consists of 11.5 acres of land covered by the brick and concrete marine industrial buildings (described in Section 3.0) and impervious pavement. The land is essentially flat at elevation 12± feet NGVD. Roughly, 1.8 acres of the land is historic uplands; 9.7± acres is former private tidelands that have been bulkheaded and filled. The marine industrial nature of the land has left the site with little or no value as habitat. Likewise, the land has no geohydrological potential.

The marine portion of the site consists of 20.8± acres of open water in Boston Harbor and the 2± acres of pile supported piers and bulkheads described in Section 3.0. Approximately 3.5 acres of this area is private tideland; the remainder is Commonwealth tideland. Water depths adjacent to the piers are 30 to 35 feet deep with depths to 50± feet provided between piers 2 and 3 under the floating drydock. The site location is 1,200 feet landward of the Boston Inner Harbor, a deepwater shipping channel maintained at a forty foot (MLW) depth.

5.2 Coastal Context of the Site

The Boston Marine Works is located on the Boston Inner Harbor within 1,200 feet of the port of Boston's main shipping channel. The facility's proximity to the channel is significant from two standpoints. First, there is ready access from the site to the channel and the surrounding navigable deep waters of the inner harbor. Second, this 1,200 foot distance between the site and the channel provides for a relatively large separation zone within which smaller craft can safely operate and not conflict with the movements of larger vessels. Few other sites on Boston Inner Harbor can offer as sufficient a buffer zone between ship traffic and landside facilities. Therefore, there is little potential for shipyard operations to impact or be impacted by the large vessels in the main ship channel.

It should also be noted that this developed waterfront area has been identified as part of an important deepwater section of the East Boston Waterfront.* But the site's proximity to the neighboring Jeffries Point residential area and the limited roadway access via a single residential street severely constrains the site's landside support potential for any deepwater port development.

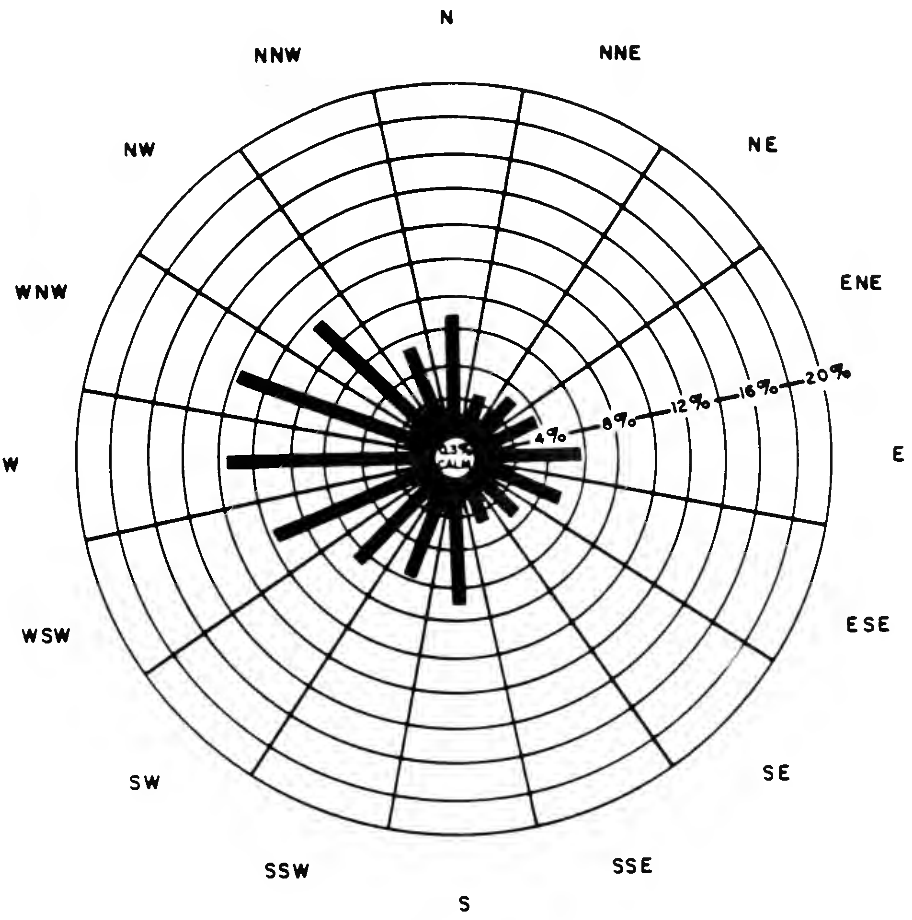
The majority of the developed upland is filled private tideland with the shorefront structurally bulkheaded with granite, concrete, and wood. Consequently, the "Coastal Bank" (the bulkheaded shorefront), the "Land Subject to Coastal Storm Flowage", and the "Land Under the Ocean" (seaward of the bulkheads) are the only physical coastal resource areas at the site which are protected by the Coastal Regulations promulgated under the Massachusetts Wetlands Protection Act. The waterfront area, seaward of the mean high water line, is also identified as "Designated Port Area" under those regulations. The five piers on the site project out between 100 feet and 1,075 feet into the harbor waters but are allocated within the Pier and Bulkhead Line.

5.3 Wind, Tides, Waves, and Wake

Prevailing winds at the Boston Marine Works site are onshore, approaching the site from a westerly direction across the waters of the inner harbor. Onshore winds most frequently blow from the south-southwest to west-northwest. Offshore winds from the east to northeast quadrants have a higher average velocity, but shorter duration and the site is protected from these winds by existing land forms. The average wind speed from all directions is 13 miles an hour. Figure 5-1 is the Boston Wind Rose; Tables 5-1 and 5-2 provide information on surface winds in the Boston Harbor area.

Reference to the NOAA, National Ocean Service (NOS) tide tables indicates that the mean tidal range at Boston Harbor is approximately 9.5 feet, and the spring tide range is 11.0 feet. The mean highwater elevation is 4.87 feet (NGVD), and the spring high tide elevation is 5.91 feet (NGVD). Actual storm wave impacts have minimal effect on the Boston Marine Works due to the site's geographic location, limited exposure to storm waves, limited orientation to storm generated waves, and the beneficial effect of existing piers, the floating drydock, and berthed vessels in reducing wave impacts. While the site is potentially vulnerable to wind waves generated from the southeast, as shown on Figure 5-1 and on Table 5-1, the winds above 20 mph which are necessary to generate storm waves from this direction are seasonal and not

* TBHA "Water-Dependent Use Study", October 1986.



NOTE
DIRECTION REPRESENTS SECTOR FROM WHICH THE WIND BLOWS

SOURCE: National Climatic Center
Asheville, NC.

ANNUAL FREQUENCY DISTRIBUTION (PERCENTAGE OCCURRENCE) OF WIND DIRECTION FOR BOSTON, MASSACHUSETTS (1970-1981)

FIGURE 5-1 BOSTON WIND ROSE

TABLE 5-1
BOSTON SURFACE WINDS (1965 - 1974) - LOGAN AIRPORT
PERCENT FREQUENCY DISTRIBUTION
BY WIND SPEED (MPH) AND DIRECTION

DIRECTION	0-4	5-7	8-12	13-19	20-24	25-31	32-38	39-45	46 +	TOTAL
N	.30	1.40	3.00	2.20	.40	.10	.04	0.00	0.00	7.44
NNE	.20	.80	.90	.70	.20	.10	0.00	0.00	0.00	2.90
NE	.20	.50	1.10	1.00	.30	.20	0.00	0.00	0.00	3.30
ENE	.10	.70	1.20	1.10	.30	.10	0.00	0.00	0.00	3.50
E	.30	1.00	2.40	2.30	.30	.10	.02	0.00	0.00	6.42
ESE	.30	.90	1.90	1.90	.30	0.00	.02	0.00	0.00	5.32
SE	.20	1.00	1.60	.60	0.00	0.00	0.00	0.00	0.00	3.40
SSE	.20	.80	1.10	.40	0.00	0.00	0.00	0.00	0.00	2.50
S	.30	1.60	3.00	1.80	.20	.10	.02	0.00	0.00	7.02
SSW	.10	.70	2.00	2.40	.60	.10	0.00	0.00	0.00	5.90
SW	.10	.80	1.90	2.70	.60	.10	0.00	0.00	0.00	6.20
WSW	.10	1.10	3.30	3.90	.70	.10	.04	0.00	0.00	9.24
W	.20	.90	2.70	5.00	1.50	.50	.10	.05	0.00	10.95
WNW	.10	.70	2.70	4.70	1.60	.50	.10	.05	0.00	10.45
NW	.10	.80	3.10	4.10	1.10	.30	.06	0.00	0.00	9.56
NNW	.10	.70	2.20	2.20	.40	0.00	0.00	0.00	0.00	5.60
CALM	.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	.30
TOTAL	3.30	14.30	34.20	36.90	8.50	2.30	.40	.10	0.00	100.00

TABLE 5-2
BOSTON (LOGAN AIRPORT NWS) AVERAGE MONTHLY
WIND SPEEDS (MPH)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
13	14	14	14	12	11	10	10	11	12	13	13

statistically significant. Stillwater tide heights associated with coastal storm surges reach elevations of 10.3 feet (NGVD) during events of 100 year frequency and 10.0 feet (NGVD) during events of 50 year frequency. Tidal currents flood to the northwest at 0.7± knots and ebb to the southeast at 0.8± knots.

Due to the level of commercial craft activity operating within the 1,200 ft. zone between the site and the main ship channel, the site is exposed to wave "agitation" consisting of generally low amplitude surface motions of varying periods created by reflected and diffracted wave patterns from various sources including: remnants of ocean swell, vessel movements and locally generated waves and their interactions. The proponent has studied these wave and vessel wake surface motions and the potential problems they present to the Boston Marine Works as part of the site engineering analysis. As part of this work, a wave and wake impact evaluation was prepared and a wave climate analysis considered the general wind characteristics shown in Table 5-1 and 5-2, correlating that information with site observations and factors such as, orientation to open water, to evaluate the potential for wave impacts. Based on this study, it was concluded that locally generated windwaves and ocean swell were not a potential cause of wave damage at the Boston Marine Works mostly due to the site's geographic location. The Marine Works is protected from the direct effects of regional storm winds from the NW, N, NE and East by existing land, buildings, and other structures. The site is further protected from wave impacts from other directions due to a combination of factors including; angular spreading, shoaling and limitations on effective fetch (0.50 to 2.75 miles) for generating storm waves. Therefore, vessel wake impacts on the site were studied independently from wind impacts because vessels operate less frequently and at lower speeds in high wind conditions. Thus, the potential combined wind and wake effect is minimized by harbor conditions and the vessel operators' need to proceed safely at reduced speed. The analysis did address the potential for vessel wake impacts at the Boston Marine Works and concluded that these effects were not a factor on ship repair operations and had not resulted in any significant damage to the site. References of particular relevance from that study are provided at the end of this section. Information from Sorenson (Reference No. 1) illustrated the range of ship generated wave heights versus vessel speed and distance from sailing line for representative vessels of varying sizes and types. The validity of that information has been verified by more contemporary investigations, including References (2) through (5). Sethness (2), for example, has summarized studies conducted of more contemporary vessel wake heights and that information is included as Table 5-3. Wave heights at 200 feet from the sailing line are less than 1½ feet for the noted vessels travelling at up to ten knots. Nece and Skjelbreia (4) carried out full scale prototype wave attenuation tests using a

TABLE 5-3
COMPUTER GENERATED SHIP WAKE HEIGHTS[1]
AT 200 FEET (61 METERS) OFF SAILING LINE

Vessel Type	Length Feet (Meters)	Beam Feet (Meters)	Draft Feet (Meters)	Displacement Tons (Metric)	Correction a'	Correction b'	Wake Heights In Feet (Meters) Vessel Speed (Knots) 5	6	7	8	9	10
Cruiser[2]	65.0 (19.8)	8.0 (2.4)	3.0 (0.9)	51 (46.3)	1.0	0.0	0.38 (0.12)	0.53 (0.16)	0.71 (0.22)	0.91 (0.28)	1.13 (0.34)	1.38 (0.42)
Barge[3]	264.0 (80.5)	54.0 (16.5)	14.0 (4.3)	4,972.0 (4,511.0)	1.0	0.0	0.02 (0.01)	0.07 (0.02)	0.18 (0.06)	0.36 (0.11)	0.63 (0.19)	0.98 (0.30)
Mariner Class[4] Cargo Ship	566.0 (172.5)	74.0 (22.6)	24.0 (7.3)	16,500.0 (14,968.0)	1.0	0.0	0.01 (0.00)	0.03 (0.01)	0.09 (0.03)	0.22 (0.07)	0.43 (0.13)	0.73 (0.22)
Tugboat[5]	93.0 (28.4)	28.0 (8.5)	8.0 (2.4)	219.0 (199.0)	1.0	0.0	0.19 (0.06)	0.35 (0.11)	0.56 (0.17)	0.81 (0.25)	1.10 (0.34)	1.41 (0.43)
Tugboat[6]	153.0 (46.6)	34.0 (10.4)	14.0 (4.3)	1,090.0 (989.0)	1.0	0.0	0.07 (0.02)	0.17 (0.05)	0.35 (0.11)	0.59 (0.18)	0.90 (0.27)	1.25 (0.38)

Source: Sethness, E. D. - "A Practical Application of a Floating Breakwater - The Philadelphia Marine Center:, Proc. ASCE Coastal Hydrodynamics Spec. Conf. June 1987.

1 Reference 4
2 Das 1969
3 Bidde 1968
4 Hay 1967
5 Kurata and Oda 1984
6 Hay 1967

40-foot U. S. Coast Guard Utility Boat and a 100 foot tug. Seymour (5) has reviewed various wave criteria for harbor design and presents information for representative vessels ranging from small craft up to ocean-going cargo ships demonstrating maximum wave heights of generally two feet or less at 100 feet or more from the sailing line. For typical harbor craft (6), including those currently in use in Boston Harbor, vessel wakes at 100 feet from the sailing line will generally be on the order of 2½ feet or less with a corresponding wave length of less than 40 feet for vessels travelling at up to ten knots. But, vessel wake wave heights diminish rapidly with distance from the sailing line so that at 500 feet from the sailing line, the wake is further reduced by angular spreading and wave surface interactions. At 1,200 feet from the sailing line, at the seaward portion of the site, the wake effect is insignificant.

5.4 Abutting Land Uses

To the southwest, the Boston Marine Works site is abutted by Boston Harbor. The land area west of the site is the East Boston Piers owned by Massport and includes four piers. While Pier 1 is a large, actively used warehouse facility, the rest of this waterfront property is badly deteriorated and under-used. For the most part, activities at Piers 3-5 (there is no Pier 2) consist of temporary docking at the piers and inefficient storage on the land side of the property. Between the Massport piers and Marginal Street, the major source of vehicular access to this portion of the East Boston waterfront, is a small, inactive railyard that formerly served the various marine industrial activities on the waterfront.

Directly behind the Boston Marine Works site, a hill rises to the Jeffries Point neighborhood. The neighborhood is a tightly knit, older residential neighborhood that lies between the site and Logan Airport. The buildings are a mix of brick and frame structures built in the nineteenth century. Typically, the housing is two- and three-story buildings with a mix of single-family and multi-family uses. While the neighborhood is older, there are obvious signs of scattered renovation and remodelling as many residents have taken advantage of their views of the Boston skyline by constructing decks and installing picture windows.

To the east of the site are waterfront users buffering Boston Marine Works from the airport facilities. These include the Massport-owned Naval Fuel Pier facility, the Jeffries Point Yacht Club, and a newly completed portion of Massport's Harborwalk at the edge of the airport property.

At slightly greater distances from the site are Logan Airport and the rest of East Boston. The airport, which is less than half a mile distant, lies to the north and east. East Boston is to the northwest. The Maverick Square area of East Boston, with its mixed commercial uses and its MBTA Blue Line Station, lies two-thirds of a mile to the northwest.

5.5 Socioeconomic Conditions

Historically, the old shipyard facilities were economically significant within the local East Boston area, providing revenue and work to the community. Recently, manufacturing jobs have been a major source of employment for the workers in East Boston but these jobs are now disappearing and unemployment has become a problem. In 1985, more than one in five resident employees in East Boston worked in manufacturing, compared to a one in seven ratio throughout the City of Boston. In 1970, over 25 percent of East Boston residents worked in manufacturing jobs. In 1985, one in three workers held craft, operative or laboring positions, compared to one in five citywide. Household median income was $13,000 compared to the city median of $19,250 (7).

Household incomes in East Boston declined 13.4 percent between 1979 and 1984 while incomes citywide increased.

The largest detriment to East Boston's economy has been the decline of manufacturing employment. The East Boston neighborhood has been particularly hard hit since a greater share of the community's establishments have been devoted to manufacturing, and because a large percentage of its residents have worked in trade, particularly wood product, ship-building and the apparel industries. In the past three years, 400 such jobs have been lost in the area, one-third of the total of such positions.

Twenty-five percent of East Boston's work force is employed in East Boston and fifty percent elsewhere in Boston. Restaurants and local shops obviously have suffered indirectly when manufacturing jobs were lost and fewer residents could afford to patronize their businesses. Over 7,000 Boston manufacturing jobs were lost between 1976 and 1985. Between 1967 and 1983, over one-third of the manufacturing jobs disappeared, dropping from 4,319 to 2,843, although the number of manufacturing firms operating in East Boston increased from 35 to 40. This was due to the fact that several large employers, including a shipyard and a chewing gum factory, closed. After 1983, manufacturing opportunities in East Boston continued to decline with the loss of eleven firms (including several large apparel plants) and 1,200 jobs. Industrial activity has been decreased due to several recessions, a change in regional markets and overseas competition, particularly in the garments and ship building and ship repair industries.

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5. Seymour, R.J. "Defining the Wave Climate for a Harbor", Proc. ASCE Spec. Conf., Ports '77, March 1977.

6. Gaythwaite, J.W. "Floating Breakwaters for Small Craft Facilities", Journal of Civil Engineering Practice, BSCE Section/ASCE, Volume 2, No. 1, Spring 1987.

7. East Boston Community Development Corporation Application to the Offices of Community Services, Family Support Administration and Department of Health and Human Services.

SECTION 6

6.0 ANALYSIS OF EFFECTS

The analysis presented herein provides an evaluation of how the Boston Marine Works project complies with existing applicable regulatory standards and policies and a description of the positive and negative effects of the project on the environment. Direct and indirect effects, both short-term and long-term for all phases of development are discussed.

6.1 Marine-Related Issues

6.1.1 Waterways, Regulatory, and Licensing Issues

Cashman Marine's use of the Boston Marine Works for water-dependent industrial uses in Zone 1 and water-dependent industrial and recreational uses in Zone 2 (as described in Section 3) will require limited review and permit issuance from the following state and federal agencies:

- Massachusetts DEQE - Division of Wetlands and Waterways Regulation Chapter 91 - Waterways License for Pier 1 extension and location of the floating breakwater, piles, and floats

- Massachusetts DEQE - Division of Water Pollution Control - Water Quality Certification for removal of old piles and emplacement of new piles

- Massachusetts Office of Coastal Zone Management Certification of Consistency with CZM Program Policies for the Corps of Engineers Section 10 permit

- U.S. Army Corps of Engineers Permit Issuance Under Section 10 of the Rivers and Harbors Act of 1899 for the Pier 1 extension and location of the floating breakwater, piles and floats

The proponent believes that the work and uses proposed comply with these regulations and policies in the following manner.

- Chapter 91 - Waterways Licensing - Regulatory Compliance

  The Waterways Regulation Program is administered by the Department of Environmental Quality Engineering - Division of Wetlands and Waterways Regulation Section (DWWR), and exists to implement Chapter 91 of Massachusetts General Laws and the regulations promulgated under 310 CMR 9.00. Since 1866, GL Chapter 91 has required that DEQE review and authorize the placement of structures and fill, changes in use of existing licensed structures and fill, and dredging in state waterways and tidelands.

  The purpose of Chapter 91 of the Massachusetts General Laws is to protect the public's proprietary rights and to exercise certain regulatory control in tidelands of the Commonwealth. The work proposed in Zones 1 and 2 is marine-dependent and does not represent a substantial change in use from past licensed activities. In conducting their review, the DWWR will evaluate specific criteria, as discussed below, to determine whether the Boston Marine Works project is in compliance with the environmental and use policies of the Department regarding waterways licensing.

Hazards to Navigation

The 208 slip marine services area with its floating breakwater, floats, gangways, and finger piers, as proposed at the Boston Marine Works site, will not present any significant hazard to navigation. This area will be located within the area bounded by two existing piers; the 875-foot long Pier 1, the 1,075-foot long Pier 2; and along the western side of Pier 1. The marine services area layout proposed will:

- Not extend seaward of the State Harbor Line, which is the Pier and Bulkhead Line;

- Be 1,200 feet distant from the existing ship channel and will not impede free passage;

- Not impede any line of sight required for navigation;

- Not require the alteration of an established course for vessels in the main ship channel;

- Not extend beyond the projection of the existing Pier 1 and Pier 2 structures, or interfere with access to the adjoining East Boston Piers - Pier 5 area;

- Not involve the construction of a solid fill structure;

- Not adversely affect the depth or width of an existing structure; and

- Not substantially interfere with the public right to safely pass upon the tidewaters of the Commonwealth in vessels.

The main shipping channel, forty feet in depth, is located approximately 1,200 feet seaward of the end of Pier 2 at the site. Although this channel is used for large shipping vessels, no conflicts are expected to occur since recreational craft will have ample room and opportunity to safely navigate in this area. The proposed marina and additional boat traffic will not interfere with access to adjoining areas or interfere with existing or anticipated maritime traffic. It should be noted that few marinas in Boston Harbor can provide this much separation area. The location of the marina will be in a sheltered area of private and Commonwealth tidelands and will thus afford opportunities to the public for safe water access in Boston Harbor where access was previously not allowed. Posted signs promoting safe boating practices (no wake, 5 knots speed) will limit interaction with vessels operating nearby and with larger vessels that must utilize the shipping channel.

Any debris that might be created in the rehabilitation of the piers and bulkheads will not be allowed to enter the water and will be carefully retrieved. This care will prevent flotsam from entering the shipping channel and surrounding waters and causing a hazard to navigation in the area.

Structural Criteria

The proposed project involves only the rehabilitation of existing structures, such as the reconstruction of the piles, structures and decking at the end of Pier 1, the construction of a 208 slip commercial/recreational marine services area, and the provision of a floating breakwater for wave protection. No new major waterfront construction involving fill or dredging is proposed. The layout of the proposed marina facilities was provided in Figure 3-7. The use of the shipping channel by large vessels, and the intervening area by smaller vessels, is not expected to result in wake damage at the site because there is ample separation area (up to 1200 feet)

between the passing vessels and the facility for dissipation of the wake. The proposed marine services area will be protected by a floating breakwater which has been designed to reduce wave impacts on the proposed facility. This will also protect the facility from storm waves generated by coastal storms up to the 100-year frequency event and from winds of up to 100 mph. The proposed facility will not restrict the ability to dredge any channel.

The proposed wave protection will dissipate wave energy but will not cause water stagnancy, reduce the ability of adjacent waters to flush adequately or cause or contribute to sedimentation problems in the nearby navigation channel or anchorage. The structures cannot cause increased erosion since the area is bulkheaded and no coastal beaches, or salt marshes exist near the proposed marina.

Rights of Adjacent Littoral Property Owners

The proposed structures will not interfere with any person's right to approach the adjacent property from the sea. In evaluatıng whether a structure interferes with such a right, the proximity of the structure to the property line, the density of existing structures and likelihood of future structures and increased navigational uses must be considered. The proposed marine services area will be located between and along Piers 1 and 2 which affords no access to adjacent property. On the westerly side of Pier 1, the marina slips will extend out to a point approximately 40 feet from the applicant's property line. There are no existing water-dependent industrial uses or recreational facilities in this area. There is a proposal for the construction of a facility to serve the lobster industry at East Boston Piers - Pier No. 5 adjacent to the westerly property line. The proposed marine services area, however, will in no way impair access to this facility and in fact, will provide some wave and wake protection to any proposed use of the Pier 5 area. Sufficient offset from the property line will provide for a shared access channel of adequate width on the proponent's side of the line.

Reserved Public Rights

In addition to allowing adjacent property owners to approach their properties from the sea, in the foreshore the reserved public rights are:

- The right to fishing;
- The right to fowling; and
- The right to navigation.

The rights to fishing and fowling include the right to take or attempt to take fish or fowl, the right to protect their habitats and food sources, and the right to pass freely along the foreshore for these purposes. The right to navigation includes not only the right to operate watercraft, but also any activity involving transport or the loading of goods to or from such watercraft. These rights will not be infringed upon. Rather, they will be improved. The proposed marine services area will allow public access to these private tidelands where it was previously not provided.

Public Lateral Access

In considering Public Lateral Access, projects which will obstruct lateral access below the high water mark must be constructed to allow for public passage in the exercise of the reserved public rights. If, due to the construction of a project, the land landward of the low water mark is eliminated (i.e., by bulkheading), lateral access should be otherwise provided by the licensee. In the case of this project, the entire shoreline has been bulkheaded since the mid-1800's. The proposed marine services area will provide and greatly enhance public access to a portion of the Boston Harbor waterfront where it was previously not permitted.

Projects in Commonwealth Tidelands

The DEQE protects the public's rights in the Commonwealth tidelands and conditions any project which would be harmful to the public ownership of the Commonwealth tidelands, or that would significantly impair the value of those tidelands to the public. The proposed project will enhance the value of the tidelands to the public. It will in no way be detrimental to the public ownership of these tidelands. The project will neither block the public view of Boston Harbor, nor be incompatible with the existing characteristics of the shipyard or the adjacent neighborhood. It will have no shadow or wind velocity impact. There will be a temporary noise impact due to the driving of pilings necessary for the rehabilitation of the piers and bulkheads. This temporary increase in noise level is not expected to be critical since residential areas immediately abutting the site are at least 700 feet away from the work areas. Noise levels produced by normal operations at the graving dock are not expected to exceed those produced by the previous tenants and will be compatible with the character of the area.

The proposed project will increase public access to the water from the shore where no such access has previously existed. The project will not have an adverse effect on a public recreational facility since none abut the site. Should a public recreational facility be established near the site in the future, as part of the East Boston Piers project, the proposed work would further enhance the public enjoyment of this area. The proponent does not propose to remove, displace, damage or destroy any known underwater archaeological resources and the proposed work will not occur within 300 feet of an historic site or district.

Criteria for Resource Areas

The following resource areas exist on the site:

- Land Under the Ocean
- Coastal Bank
- Land Subject to Coastal Storm Flowage

On September 29, 1987, Cashman submitted a Notice of Intent (File No. 6-357) to the Boston Conservation Commission for proposed improvements to the marine services area. Cashman will perform the work proposed for this area in conformance with the Order of Conditions that will be issued by the Commission. Compliance with the Order of Conditions automatically complies with DEQE requirements at 310 CMR 9.23(3) - 9.23(10). No dredging or solid fill structures are proposed. Negative impacts to these resources will be minimal due to the proposed limited work and the industrial nature of the area. Pile driving for any repairs and the proposed marina will be conducted in a manner to reduce the amount of bottom disturbance and turbidity. The proposed structures will increase the area available to colonizing organisms such as barnacles and mussels and seaweeds of various species. The existing bulkheads and piers (coastal bank) will be maintained and improved as necessary.

- DWPC/Water Quality Certification

  The Massachusetts Department of Environmental Quality Engineering, Division of Water Pollution Control administers the Water Quality Certification (WQC) program and the regulations promulgated under 310 CMR 9.00 regarding dredging, spoils disposal, or filling in waters and wetland areas of the Commonwealth. WQC approval is also required for any project work that must be permitted by the U.S. Army Corps of Engineers under their Section 10

or Section 404 programs. The purpose of the WQC program is to ensure project consistency with water quality standards for projects subject to jurisdiction under Section 401 of the Water Pollution Control Act. A WQC application and departmental approval will be necessary for construction of the floating breakwater, floats and finger piers as part of the COE permitting.

- <u>MCZM/Consistency Certification for Program Policy No. 7 - Designated Port Areas</u>

The Massachusetts Office of Coastal Zone Management (MCZM) has implemented program policies to promote appropriate uses on the Massachusetts coast. MCZM Program Policy No. 7 encourages maritime commerce and development in urban waterfront designated as port areas (Designated Port Areas). This policy also prevents the exclusion of maritime-dependent industrial uses that require the use of land subject to tidelands licenses. The intent of this policy is to ensure that, within port areas, the special physical and operational requirements of uses dependent on access to navigable channels are not impaired by other development. By assigning priority to maritime-dependent industrial development in designated port areas, this policy encourages the utilization of port areas for these uses. This, in turn, minimizes the need for dredging additional deepwater channels elsewhere and maximizes the use of prior public investments made in existing ports.

The Boston Marine Works site has been included as part of the East Boston Designated Port Area (see Figure 6.1-1) as provided for in the regulations pertaining to the Administration of Waterways Licenses at CMR 9.24(1)(a) because of its deepwater and prior shipyard use. But, this site meets the criteria for such a designation with the following qualifications:

1) The navigable channel (the main ship channel) is 40 feet deep. The water depths at the site are 30 to 35 feet deep at mean low water.

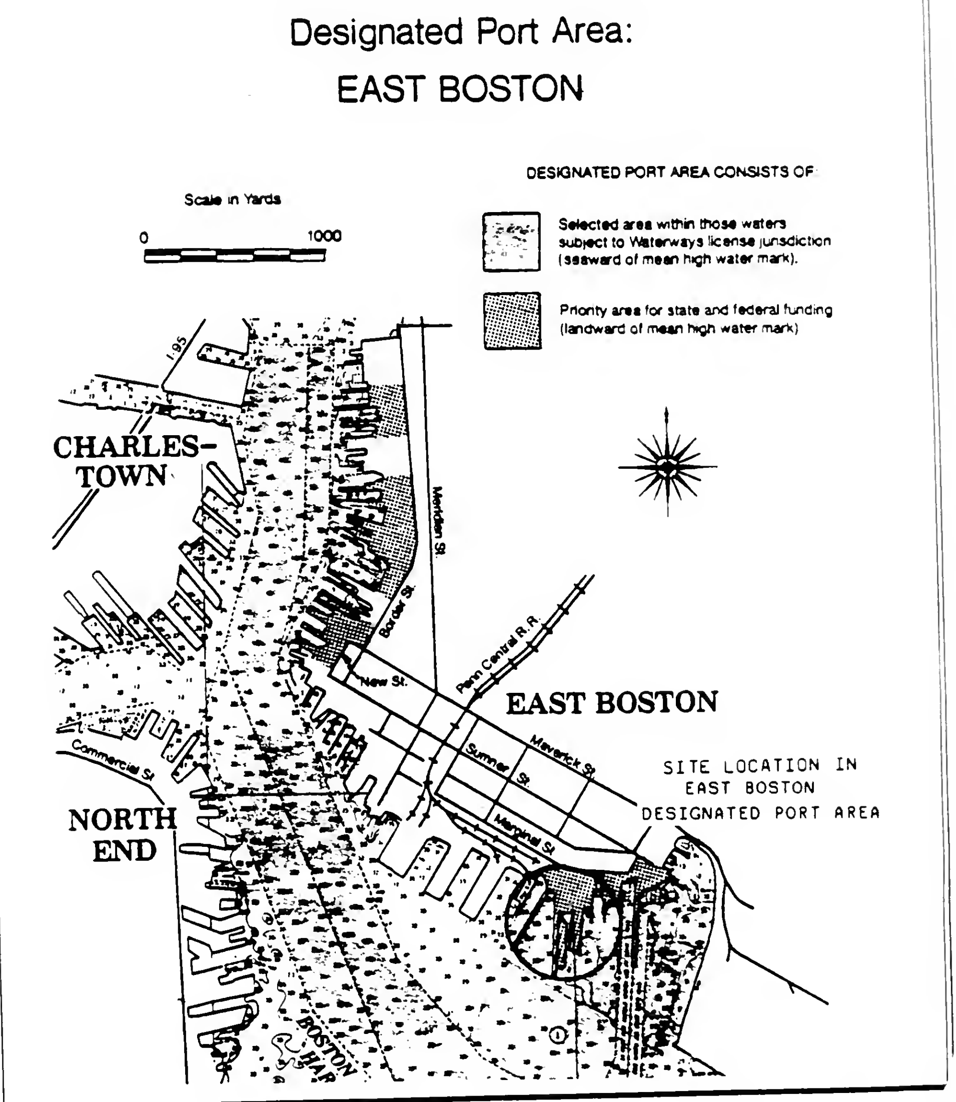

FIGURE 6.1-1 EAST BOSTON DESIGNATED PORT AREA

2) The tideland and associated upland is suited for marine-dependent industrial shipyard uses by its topography, size, and existing equipment. The site is flat, and the docks, piers, gantry cranes, and drydock are suited for ship repair. The shipyard is zoned for waterfront industrial use, however, its proximity to the adjacent Jeffries Point residential neighborhood limits its use for certain deepwater port activities.

3) A rail link leads to the site, but is paved over and not considered to be in a useable condition. Major roadway trunk and arterial routes are available, but they are separated from the site by the one neighborhood street (Marginal Street) that provides access to the site. Marginal Street is narrow with small radius turns, thus limiting truck access.

4) Water and sewer services capable of supporting maritime-dependent industrial uses have already been constructed to service the former East Boston Shipyard; and

5) The past shipyard use was consistent with the MCZM program policy as a ship repair facility only.

The landward limit of the Designated Port Area at the Boston Marine Works is the present highwater mark. As indicated in 310 CMR 9.24(4), "In designated port areas, the Department shall not license any project for non-maritime-dependent use which conflicts with or pre-empts a maritime-dependent use." But, where a non-maritime-dependent use (e.g., marine services area with a recreational component) is proposed in a Designated Port Area, it may be approved when 1) it does not conflict with or pre-empt marine-dependent industrial uses; 2) it does not irreversibly commit the site for such a non-industrial use; and 3) it does not interfere with the provision of the special physical and operational requirements of a future industrial use in the port area. The Boston Marine Works proposal meets these requirements, as well as the MCZM requirements as discussed below.

The proponent proposes the reuse and rehabilitation of the East Boston Shipyard as the Boston Marine Works. The existing buildings, cranes, piers, and yard area on the 34.3 acres of land and water that make up the site will be renovated and used for maritime-dependent industrial use to the extent that there is a market for such facilities in Boston Harbor. The project involves no signficant new construction, filling or dredging. Cashman Marine Enterprises will use the existing graving dry dock for ship repair and a major portion of the marine-dependent industrial part of the site as a storage, staging and operation site for its marine contracting business. The marine-dependent industrial portion of the Boston Marine Works will involve approximately 64% of the site. The remainder of the waterfront reuse includes the development of a marine service area with a 208 slip marina, marina support facilities, and parking for this dual use area.

This mix of uses is consistent with the use provisions of Policy No. 7. Non-maritime-dependent uses can be permitted in designated port areas which require tidelands licenses if they do not deter viable economic uses of vacant port lands. These uses must not, however, irreversibly commit the site to such uses. The proposed marine services area, although not totally a maritime-dependent industrial use, will incorporate a marine-dependent use on an interim basis. The proposed marina use will operate under a 25-year lease which would allow Massport to utilize this portion of the site for maritime-dependent industrial uses in the future should the marine industrial market improve. The interim marine services use will actually assist Massport in exercising any option to return the piers to a large scale ship repair use when the market demands such a change, since the piers and bulkheads will be upgraded and maintained (to prevent further deterioration) by income generated from marina sales, service and operation and the aforementioned office space use. It should also be noted that no public agencies, fishing, maritime shipping, or marine industry spokesperson has expressed firm interest in the shipyard, documented in the form of a plan or feasibility study, for use of the site for maritime-dependent industrial uses to a greater extent than the proposed project.

- <u>Army Corps of Engineers Section 10 Permit</u>

  Section 10 of the Rivers and Harbors Act of 1899 prohibits the obstruction or alteration of navigable waters of the United States without a permit from the Corps of Engineers (COE). The reuse of the site for marine-dependent industrial uses will not require a new Section 10 permit. The construction of the new floating breakwater, the Pier 1 extension, and the placement of floats and slips will require a Section 10 permit. However, the Boston Marine Works project is permittable and will comply with existing criteria. The project will be of benefit to the public interest since it will have a positive effect on some of the criteria considered by the Corps. The project will have a positive effect on:

  - Economics
  - Aesthetics
  - Navigation
  - Recreation
  - Needs and Welfare of the People
  - Considerations of Private Ownership

  The project will have no negative effect on the following criteria:

  - Conservation
  - General Environmental Concerns
  - Wetlands
  - Cultural Values
  - Fish and Wildlife Values
  - Flood Hazards
  - Shore Erosion and Accretion
  - Water Quality
  - Energy Needs
  - Safety

The proposed project will be a benefit to the economy of the area. It will also improve the aesthetics of the project site with the rehabilitation and improvement of the existing buildings and piers and the establishment of the proposed marine services area. This area in particular will be of benefit, providing the public with access to a previously restricted area. It will also open

up this area to navigation by recreational craft. Since the proposed marine services area will be within the state harbor/pierhead line, the proposed breakwater, Pier 1 extension, floats and slips will not be a hazard to navigation. The proposed project will also increase the value of abutting property, will not infringe upon abutters rights and will increase public use of the area.

The proposed marine services area will have no negative impacts on general environmental concerns, conservation, wetlands, fish and wildlife values, or water quality. Due to the existing nature of the area, the fish and wildlife values of the site are limited. Wetland resources are limited to coastal bank (bulkheads), land under the ocean, and land subject to coastal storm flowage. The proponent will utilize best available technical means to minimize and localize turbidity caused by any pile driving. Non-leaching chemicals will be used on construction materials to protect water quality. Shore erosion and accretion does not pertain to the project since the site is bulkheaded. Food and fiber production and water supply and conservation also do not appear to pertain to the project site. The project will have no effect on flood hazard due to the nature of the existing conditions.

6.1.2 Licensing History

The licensing history for this section of Boston Harbor is quite complete since the previous property owners secured the appropriate permits. These permits to perform work were issued by the Harbor and Land Commissioners and the DPW, the State agencies that authorized waterfront work before DEQE became the permitting authority.

Licensing for structures and other work was traced back in the Department's files to 1864 when the Harbor and Land Commissioners authorized work performed by Simpson Dry Dock Co. (License No. 2954). In 1873, the Boston and Albany Railroad performed work on the western portion of the site under License Nos. 398 and 399. Additional work was performed by the Simpson's Patent Dry Dock Company and the Boston Revere Beach and Lynn Railroad (B, RB&L RR) after they took over the Boston and Albany Railroad property.

The Harbor and Land Commissioners permitted Simpson's to perform wharf construction and dredging under License Nos. 1261 in 1890, 1399 in 1891, and 1223 in 1894. The B, RB&L RR was authorized to perform additional timber wharf construction in 1898. Additional improvements were performed between 1900 and 1920 in this area under licenses to both parties.

At this point, the B, RB&L RR property became part of the Simpson's Dry Dock Co. property and Simpson's was purchased by the Bethlehem Shipbuilding Corporation, Ltd. DPW License No. 433 authorized the construction of Pier 3 and placement of the floating drydock. Subsequent licenses to Bethlehem permitted construction of the waterfront and pier facilities that have now become the Boston Marine Works.

Cashman Marine Enterprises, Inc. now proposes to rehabilitate and reuse the existing Boston Shipyard Corporation facilities for marine dependent uses. The majority of the shipyard land and water area (9 of 11 buildings, 4 of 5 piers, the floating dry dock and the graving dry dock) will be reused for ship repair, drydock and marine dependent industrial space. Since there is no expansion or change in use, additional Chapter 91 Licensing for this reuse is not necessary. The remaining waterfront land and water area (a portion of the Combination Building, Pier 1, and the adjacent water area) will be used for a marine-dependent marine services area. The dual uses proposed in this area wll provide for marine-dependent industrial and marine-dependent recreational uses. Insofar as these uses 1) continue to be marine dependent, 2) are predominantly marine-dependent industrial, 3) do not constitute a major change in use, and 4) will not impair the special physical and operational requirements of marine-dependent industrial uses, no further licensing is necessary.

Whereas Buildings 12, 31 and 32 are located landward of the primitive highwater line are to be used for non-water dependent uses, these uses do not need to be licensed because these areas are not subject to GL Chapter 91 jurisdiction.

6.1.3 Delineation of Public and Private Tidelands

Critical to making a determination of project compliance with Waterways requirements is establishment of Chapter 91 jurisdiction in the matter and the location of private and Commonwealth tidelands. The DEQE presently has information in its files that plots the location of the primitive high water line in the project area as a line parallel to Webster Street and landward of the Boston Marine Works rear property line. This primitive highwater line location has been compared to information available in the historic licenses in the DEQE records, in records reviewed at the Massachusetts State Archives and at various historical societies to determine the accuracy of this information.

This detailed research has determined that the proper location of the primitive high waterline for this section of East Boston is a position within the alignment of Marginal Street, the street that bisects the site. This new location is supported by physical site conditions and license information. The physical site conditions are the presence of a bedrock hillside (elevation 35± ft. NGVD) behind the shipyard, upon which Webster Street is constructed. The license information relates to the Board of Harbor and Land Commissioner's License Nos. 1723 and 2727 issued to the Boston, Revere Beach, and Lynn Railroad Co. in 1894 and 1903.

The proper location of the historic high water line is shown in Figure 6.1-1. The primitive low water line from the Purham survey (1835) and the Boschke survey of "Original Low Water Lines in Boston Harbor (1861)" location has been plotted and is also shown in Figure 6.1-2.

Based on this delineation of the primitive high and low water lines, it has been determined that the Boston Marine Works project site contains 33± acres of tidelands. Approximately 12.7± acres of this area is private tidelands with 9± acres formerly flowed tideland, 2.7± acres open water area and 1± acre covered by pile held piers. The remaining 21 acres is Commonwealth Tideland, of which 1.65 acres is presently covered by pile held piers.

6.1.4 Water-Dependent and Water-Enhanced Uses

The proposed Zone 1 - Water-Dependent Industrial Area is a reuse of the existing facilities. The Zone 2 Marine Services Area is a proposal for water dependent reuse of the remaining waterfront area. Its improvement and reuse will serve industrial (commercial docking) as well as recreational (marina) water dependent needs. The recreational marina component is an integral part of the total reuse plan, providing necessary capital to fund maintenance and repair of all the waterfront facilities. The Boston Marine Works project will also provide for a public landing area, water shuttle and taxi landing area.

Water enhanced use of the harbor will be provided by the Boston Marine Works project in the form of public access in the Zone 2 area, including Pier 1, the restrooms and the restaurant. The improvement of the Golden Stairs will enhance public access from the adjacent neighborhood to the site and to future additions to Harborwalk that may be programmed for this area.

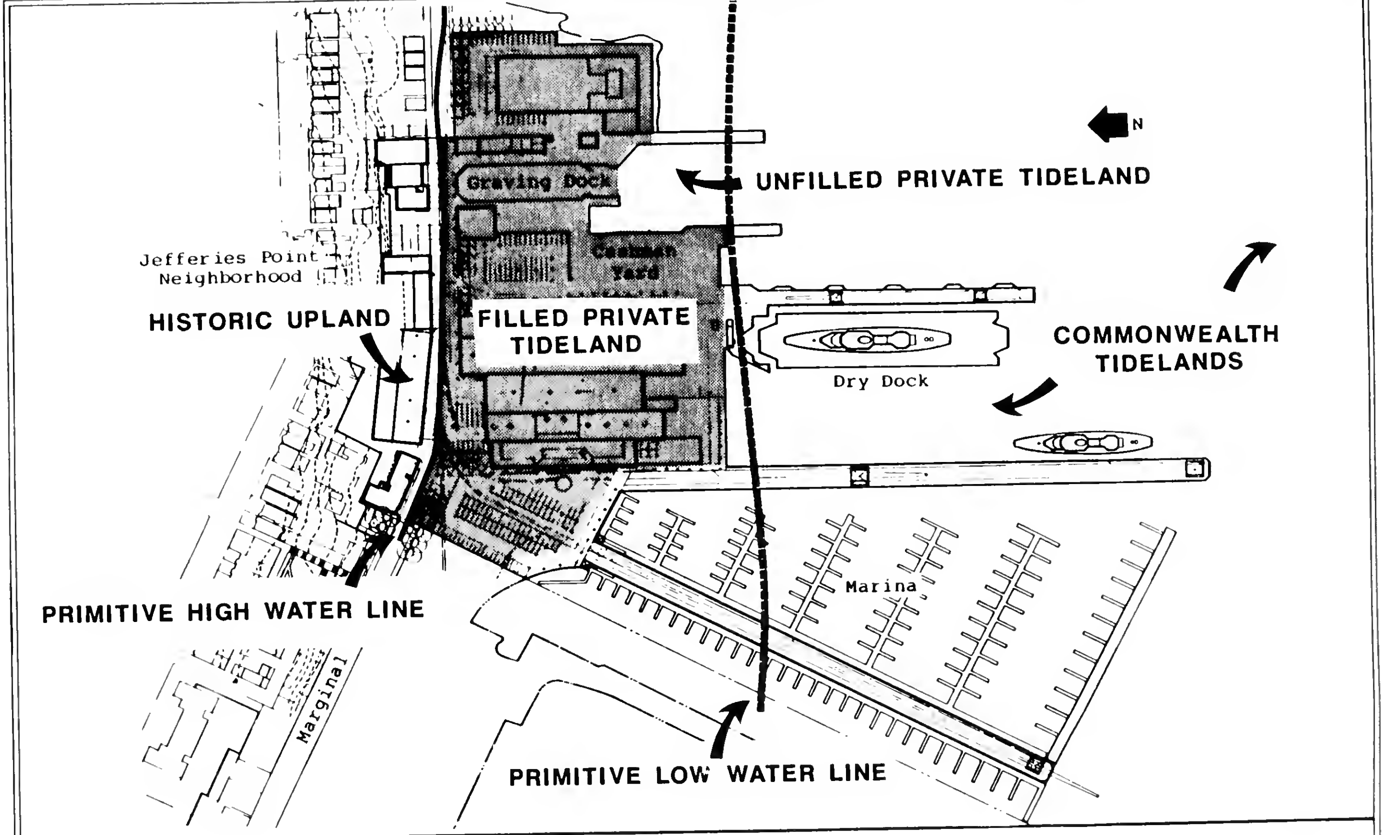

FIGURE 6.1-2 LOCATION OF HISTORIC HIGH & LOW WATER LINES AT THE BOSTON MARINE WORKS MARINA LAYOUT

6.1.5 Public Purpose

Cashman's proposal for rehabilitation of waterfront structures and reuse of the tidelands on the Boston Marine Works project site will serve a proper public purpose as water dependent uses of private and Commonwealth tidelands of Boston Harbor. The tidelands portions of the project will be devoted entirely to water-dependent uses and therefore, the project is presumed to meet the proper public purpose standard. To further substantiate the appropriateness of that presumption, a description of how the Boston Marine Works will serve a number of public purposes is described below:

1) Elimination of Deteriorated Conditions and Improvement of the Site

The shipyard has been vacant, dilapidated, and unattractive for several years. In addition, the site has not been used for public activities, has not been accessible or attractive to the public, and has not enhanced or contributed to the public's utilization of the waterfront. The Boston Marine Works project will result in an attractive and well-maintained facility which will enhance the appearance of both public and private areas in the vicinity of the buildings and will encourage and contribute to public use and enjoyment of the public walkway areas.

2) Water-Related Public Amenities

The Boston Marine Works project will include the redevelopment of the area between the Gatehouse and Piers 1 and 2 into public access on the water side of the site as well as a walkway on Pier 1. The upgrading of public park space (the Golden Stairs) to the west of the shipyard will be included as part of the proponent's landscape and site improvement plan. The proponent's waterfront area will be equipped with benches and lighting, and will provide attractive and well-maintained areas for waterfront-related passive recreational uses such as walking and viewing the waterfront. These areas will be inviting to members of the public, including visitors to the Marine Works marine, retail, and restaurant facilities, and they will contribute to increased public use of the waterfront area in the vicinity of the site. In addition, these facilities will provide public access to an area near the waterfront which has not previously been accessible or attractive to the public.

The Boston Marine Works project will also include the construction of a year-round water-taxi area. This will enhance the public's opportunity for access to water transportation on Boston Harbor and therefore will further encourage the use of such transportation.

The water-related public amenities included in the Boston Marine Works project are designed to integrate with the other water-related public amenities that are part of the East Boston waterfront redevelopment. This redevelopment involves the construction of a new public park proposed along the East Boston piers, existing parks in the Jeffries Point neighborhood, and their link to Massport's Harborwalk. In addition, it involves the provision of water-taxi landing space. The water-related public amenities included in the project will contribute to public use and enjoyment of public walkway areas near the shipyard as well as water transportation facilities.

3) Non-Water-related Public Amenities

The Boston Marine Works project will include the construction of at least 10,000 square feet of commercial marine support services and public restrooms within the Combination Building. The facilities to be located in this space will attract the public to the building and to the public areas at and in the vicinity of the building and the Marine Works waterfront. Accordingly, this commercial marine and public space will provide public access to an area near the waterfront which has not previouly been accessible or attractive to the public.

The project will also include the designation of automobile parking areas. These areas will increase the opportunities for the public to patronize the marine establishments and restaurant, to utilize the public areas at and in the vicinity of the yard and the waterfront, and to take advantage of the water transportation opportunities provided at the Boston Marine Works.

6.1.6 Public Benefit

The Boston Marine Works proposal for rehabilitation of waterfront structures and reuse of tidelands for water dependent uses is presumed to provide a greater public benefit than detriment to the rights of the public in tidelands. This determination is based on the following rationale which further substantiates the appropriateness of that presumption.

As previously described, the Boston Marine Works project will involve the addition of several water-related public amenities as well as the improvement of site conditions and the enhancement of the public waterfront park and walkway areas in East Boston. These are the principal benefits of the Boston Marine Works project relating to tidelands.

The project will provide new, attractive, and well-maintained areas for use by the public for water-related passive recreational activities. These areas will encourage increased public use of waterfront areas at and in the vicinity of the shipyard as a whole. In addition, the project will include the construction of a year-round water-taxi landing area which will improve public access to water transportation and encourage the use of such transportation. Moreover, the improvement of conditions at the site will encourage and contribute to increased public use and enjoyment of the public areas at the site as well as the public park and walkway areas nearby in East Boston.

The Marine Works project will include several nonwater-related elements which will have positive effects on the public's use of historic tidelands. Retail space, restaurants, and public restrooms in the Combination Building will attract the public to the shipyard and to the public areas along the waterfront in the vicinity of the marine services area.

The Boston Marine Works site which includes the marine services area, constitutes a significantly altered urban waterfront area, and it has been utilized for non-public water-dependent uses for several decades. Therefore, the approval of non-industrial water-dependent uses on historic tidelands as part of the project does not constitute a detriment to the public interest in these tidelands since it does not adversely affect the public rights of fishing, fowling, and navigation at the site. Indeed, as noted above, the project will result in public access to a waterfront area near the waterfront which has not previously been accessible or attractive to the public.

The perceived detriment to the public's rights in these tidelands is that the marine services area and its amenities will partially serve a non-industrial water dependent use of tidelands. However, since marine-dependent industrial use (commercial docking and repair) will continue to be the predominant use of this area, and because the marina use proposed is an integral part of this reuse plan, proposed to financially support the shipyard reuse in a manner that is consistent with the Designated Port Area provisions, the public's rights are not adversely affected. In fact, the marina portion of this project will serve to attract the public to the waterfront to use walkways, retail stores, and marina and water transportation service.

6.2 Hazardous Materials

The operation of the BSC shipyard facility included the use and consumption of a wide variety of hazardous materials. These materials included fuels, which were, for the most part, stored in underground tanks, paints and marine finishes, solvents, anti-corrosives, wood preservative, greases and other lubricants, miscellaneous petroleum products and other chemicals associated with an industrial shipyard operation. During this prior operation no meaningful hazardous materials management plan was developed. The first order of business for the proponent has been to inventory the materials on-site. Various controlled chemicals have been identified and collected. The materials that can be salvaged are being seggregated from the waste materials. The waste materials are being consolidated for removal by a licensed hazardous waste disposal contractor.

The underground fuel storage tanks on the site were old and abandoned. These tanks are being demolished by Massport. The demolition involved hiring a qualified contractor to ensure that the obsolete, reinforced concrete tanks were drained. Subsequently, the tank tops were removed and the insides cleaned.

The initiation of the proponent's activities has reintroduced the use of hazardous materials at the site. The Boston Marine Works' activities will involve the use of both fuel and the marine industrial chemicals previously cited. In several respects, however, the Boston Marine Works proposal will result in safer and more efficient handling of hazardous materials.

Fuel Tanks

The proponent is installing three new 8,000 gallon tanks for fuel storage. The tanks will handle both gasoline and diesel fuel to be dispensed to marine services customers at Pier 1. The new tanks will consist of double walled fiberglass tanks. The concrete walls and floors for the previous tansk will be retained to serve as liners or vaults for the three new fiberglass fuel tanks to be placed on-site. Saving the concrete structure results in some cost savings; at the same time, it provides a second contaminant barrier in which to set the new tanks, thereby creating additional factor of safety. The new fuel tanks will incorporate monitoring devices capable of detecting spills or leakage.

Hazardous Materials Management

Those who use hazardous materials must have suitable plans and procedures for handling controlled chemicals. In implementing Phase 1 of the Build Alternative, the proponent is developing the required plans for the Boston Marine Works.

In order to prevent pollution incidents and provide measures for hazardous substances, the proponent has appointed a Cashman senior management representative to organize, develop and direct the implementation of its comprehensive oil and hazardous materials management plan. Included in these responsibilities are compliance with federal OSHA, state Right-to-Know, DEQE hazardous materials regulations, EPA SPCC plans, U.S. Coast Guard petroleum handling requirements, and state and city fire prevention regulations. The specific details of this management plan will be formulated as the site redevelopment and tenants are identified. Appendix F is the outline for the plan. In the meantime, the proponent is developing plans for managing hazardous wastes for those components of the project starting now.

As part of the Phase 1 graving dock operations, an updated hazardous materials management plan is being developed. Also, specific site-related issues have been identified for incorporation into the total plan for the Boston Marine Works; including the present Cashman operations and future shipyard tenants.

Specific mitigation measures aimed at prevention, control and containment of oil and hazardous materials at the Boston Marine Works under the Build Alternative include the following:

- Initiation of a training program for employees on the care and handling of oil and hazardous materials used in conjunction with shipyard and marina activities.

- Provision of clearly marked and lock secured spill-proof containerization and storage for oils and hazardous materials used on-site.

- Upgrade spill protection and containment equipment on-site to deal with oil and hazardous materials discharges.

- Use of TBT and other regulated anti-foulants will be in accordance with present EPA promulgated criteria with regard to surface leaching rates, minimum vessel sizes and hull materials.

- All regulated hazardous materials inventories stored on-site will be limited to minimum quantities for efficient operations at the shipyard.

- Oil and grease traps will be installed in the site drainage system.

6.3 Sewage Disposal and Stormwater Discharge

6.3.1 Introduction

This section includes an analysis of the impact of sewage and stormwater from the project site on existing sewer and drainage systems. Since the project includes the rehabilitation of existing buildings and the establishment of less intensive uses, no increased demands on the sewer and drainage systems are anticipated. In fact, the project is expected to generate about one half the sewage that was generated on-site as late as 1985. Further, the proponent is proposing to mitigate wet weather flows by separating storm water runoff from sanitary sewage flows. A discussion of impacts on the sewer and storm drainage systems follows.

6.3.2 Sewer Connection Permit

Typically, for new construction projects requiring connection to the sewers, an application is made in accordance with 314 CMR 7.00. Design plans and specifications are submitted to the responsible municipal official. In this case, Boston Water and Sewer Commission (BWSC) and Massachusetts Water Resources Authority (MWRA) review sewer plans and forward them to DEQE - Division of Water Pollution Control (DWPC). The application must be made ninety days prior to construction of the connection.

The project site will be served by existing on-site sanitary sewers that are connected to a BWSC combined storm and sanitary sewer beneath Marginal Street. Since the project will not require any new connections to the BWSC sewer, and there will be no increase in flow over prior use, a sewer connection permit should not be necessary.*

6.3.3 Prior Use

Prior use of the site since 1945 by Bethlehem Steel and Boston Shipyard Corporation (BSC) until late 1985 included office, industrial, dormitory, food preparation, warehouse and retail space. The distribution of use has been discussed in Section 3.0. The sewage generation rate from this prior use has been estimated as shown in Table 6.3-1. The estimate is based on factors specified by DEQE in 310 CMR 15,00, State Environmental Code, Title 5. It should be noted that the estimate for the dormitory refers to the

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* Personal Communication with Mr. Frank DePaola, Boston Water and Sewer Commission, November, 1987, and Mr. Harry Trent, DEQE-DWPC, December 1987.

TABLE 6.3-1

SEWAGE GENERATION RATE

BOSTON SHIPYARD CORPORATION/BETHLEHEM STEEL

(1945 to 1985)

Office Space: 31,976 SF x 75 gpd/1,000 SF*	= 2,400 gpd
Industrial Use: 380 employees x 20 gpd/employee**	= 7,600 gpd
Dormitory: 250 crew members x 65 gpd/member***	= 16,250 gpd
Retail Sales/Laundry: 4 machines x 400 gpd/machine*	= 1,600 gpd
	27,850 gpd

Using a peaking factor of 3.0, the peak flow is estimated at about 83,550 gpd (0.084 MGD).

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* Sewage Flow Factors from DEQE, 310 CMR 15.00, State Environmental Code, Title 5.

** Assumed Industrial Plant, with cafeteria (20 gpd/person per Title 5).

*** Assumed similar to a boarding school including food service, showers, etc. (65 gpd/person per Title 5).

practice of providing housing for crew members of U.S. Navy ships during vessel maintenance and repair at the shipyard. Crew members were housed at the BSC facility for up to nine months at a time while their ships were docked. The average estimated sewer generation rate for previous use of the site is 27,850 gpd, with an estimated peak flow of about 83,550 gpd.

6.3.4 Proposed Use

Sewage generation rates for the proposed project have been made based on the projected office space, industrial use, retail space, as well as marina-related services (see Table 3-1). A bathhouse with shower and toilets will be provided for marina users. A conservative estimate of marina sewage generation rate has been made based on a total of 416 persons/day (2 persons/slip) using the facilities. These sewage generation estimates based on 416 persons/day are considered sufficiently conservative to account for actual marina related sewage generation rates including pump-out services. The existing Barracks Building includes a kitchen facility that might be used for a food catering service for cruise boats. The rooftop of the Power House will be developed into a 100-seat restaurant. Sewage generation from these facilities has been included in Table 6.3-2. The resultant sewage generation rate for the proposed project is about 15,885 gpd, with an estimated peak flow of about 47,655 gpd. This rate is about half of the previous user's rate.

6.3.5 Sewer Route

The project site is served by a 12" BWSC combined sewer that runs through the site beneath Marginal Street. This is shown in Figure 6.3-1. A network of private sewers on-site connect the existing buildings to the 12" BWSC combined sanitary and storm drain sewer. Stormwater catch basins in Marginal Street also discharge to the 12" combined sewer. Stormwater drainage is discussed in a separate paragraph below.

The BWSC 12" sewer discharges to the head end of the MWRA East Boston Branch Sewer (EBBS) about 150 feet northwest of the site. The East Boston Branch Sewer serves most of East Boston, as shown on Figure 6.3-2. The EBBS continues northwest along Marginal Street, then turns northeast on Orleans Street, continues northeast on Bremen Street, and then onto Chelsea Street. The EBBS discharges to the East Boston Steam Pump Station on Addison Street. Presently, the East Boston Steam Pump Station does not normally operate during dry weather. Instead, sewage from the EBBS flows through a siphon under

TABLE 6.3-2

SEWAGE GENERATION RATE

PROPOSED BOSTON MARINE WORKS PROJECT

Office Space: 35,209 SF x 75 gpd/1000 SF*	=	2,640 gpd
Heavy and Light Industrial Use: 177 employees x 20 gpd/employee*	=	3,540 gpd
Marina: 208 slips x 2 persons/slip x 10 gpd/person**	=	4,160 gpd
Retail Sales: 10,894 SF x 5 gpd/100 SF*	=	545 gpd
Restaurant: 100 seats x 35 gpd/seat*	=	3,500 gpd
Kitchen for Catering Service: 100 seats x 15 gpd/seat*	=	1,500 gpd
	TOTAL	15,885 gpd

Using a peaking factor of 3.0, the peak flow is estimated at about 47,655 gpd (0.047 MGD)

* Sewage flow factors from DEQE, 310 CMR 15.00, State Environmental Code, Title 5.

** Assumed similar to a public park with bathhouse, shower, and flush toilets (10 gpd/person per Title 5).

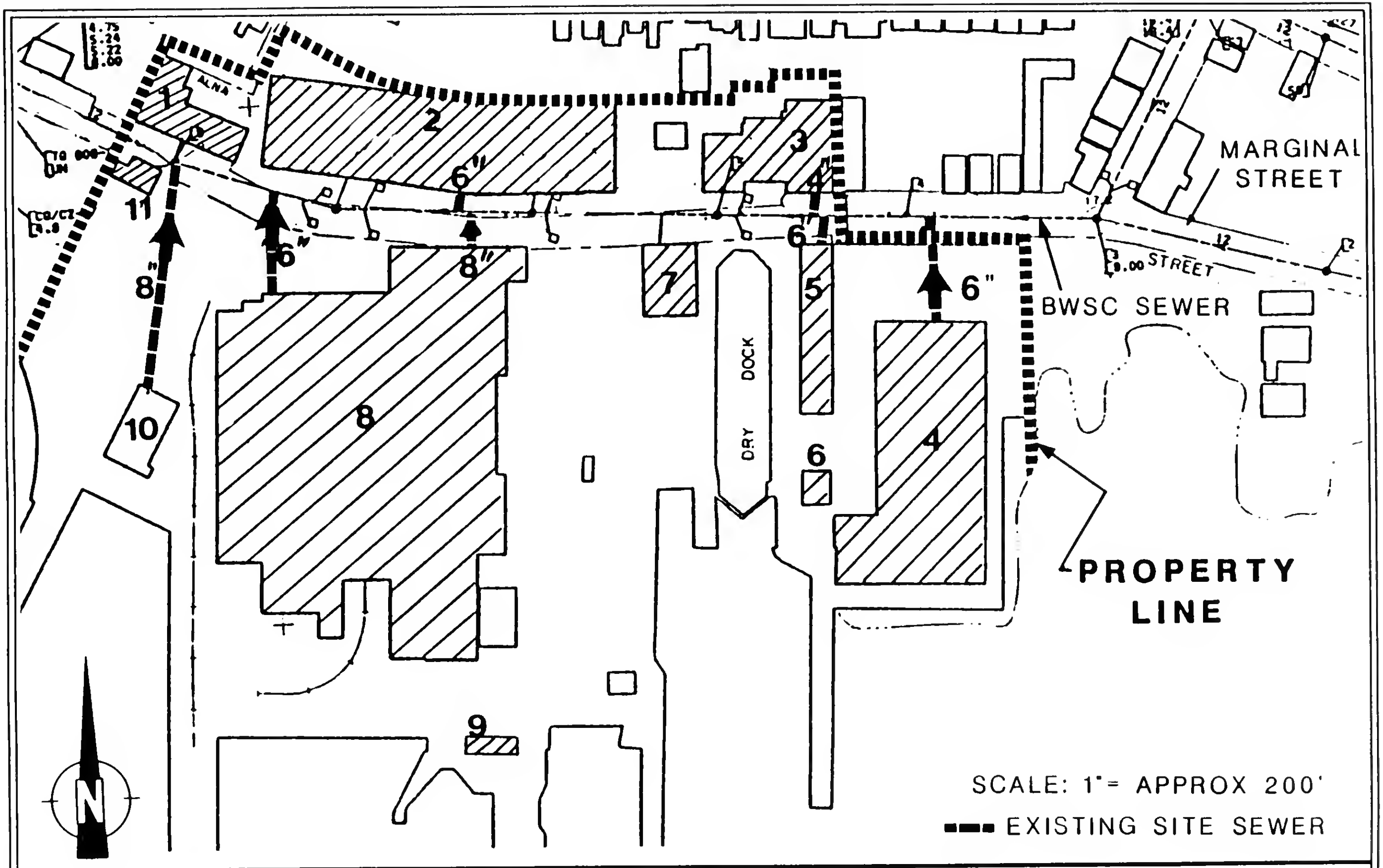

FIGURE 6.3-1 PROJECT SITE LOCAL SEWERS

Source: BWSC Wastewater system map No.25M

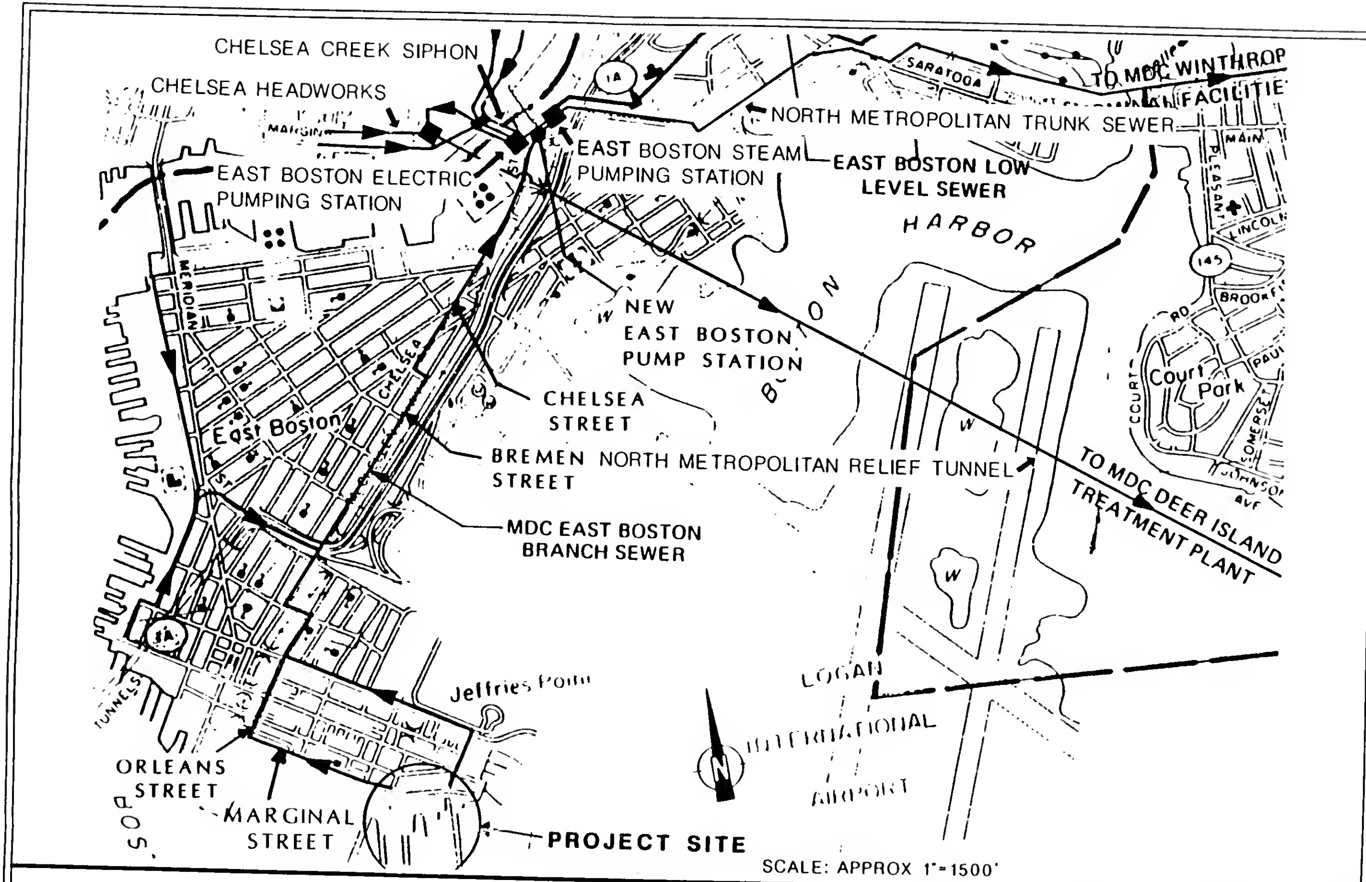

FIGURE 6.3-2
SEWER ROUTE • PROJECT SITE
TO DEER ISLAND TREATMENT PLANT

Source: Boston Wastewater Facilities Plan Boston Water & Sewer Commission

Chelsea Creek to the Chelsea Creek Headworks. Under these conditions, sewage from the EBBS is transported to the Deer Island Treatment Plant via the North Metropolitan Relief Tunnel. The Deer Island Treatment Plant provides primary treatment and chlorination with discharge to Boston Harbor.

During wet weather conditions, the East Boston Steam Pumping Station and the East Boston Electric Pumping Station are used to pump diverted flows from the Chelsea Creek Headworks, including the flow from the EBBS. These pumping stations discharge to the North Metropolitan Trunk Sewer that runs through Winthrop to the Winthrop Terminal Facility on Deer Island. The Winthrop Terminal Facility consists of screening, grit chambers, and pumps that discharge to the Deer Island Treatment Plant.

In order to alleviate problems with sewers in East Boston, as well as Chelsea and Revere, improvements are underway by MWRA. A new East Boston Pump Station is under construction. It is scheduled for completion in January, 1989, about the same time that the Boston Marine Works would be fully operational. The new station will serve East Boston, including the EBBS, Revere, Chelsea, and the bypassed flows from the Chelsea Creek Headworks. The new station will operate continuously, pumping dry and wet weather flows via the North Metropolitan Trunk Sewer.

There will no longer be diversion of flows from the EBBS to the Chelsea Creek Headworks, so that dry weather surcharging and associated sedimentation probelms will be eliminated. In addition, the pump station has been designed to handle 100 mgd of bypass wet weather flows from the Chelsea Creek Headworks and 20 mgd of wet weather flows from the East Boston combined sewer system.*

6.3.6 Combined Sewer Overflows

The regulators and combined sewer overflows (CSO) in East Boston are part of the Boston Water and Sewer Commission (BWSC) system. The MWRA-owned East Boston Branch Sewer (EBBS) is connected to this sewer system via the BWSC-owned local combined sewers. Overflows from the MWRA EBBS discharge through these BWSC combined sewer overflows during wet weather conditions.

The EBBS includes a system of regulators and combined sewer overflows (CSO) to provide relief during storm conditions. The CSOs along the EBBS discharge to the Chelsea Creek and the Boston Inner Harbor. CSOs in the project area are shown on Figure 6.3-3.

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* "East Boston Pumping Station Facility Planning Project Report, Volume II-EID", prepared for MDC, prepared by Metcalf & Eddy, March, 1983, pp. 4-24, 4-26.

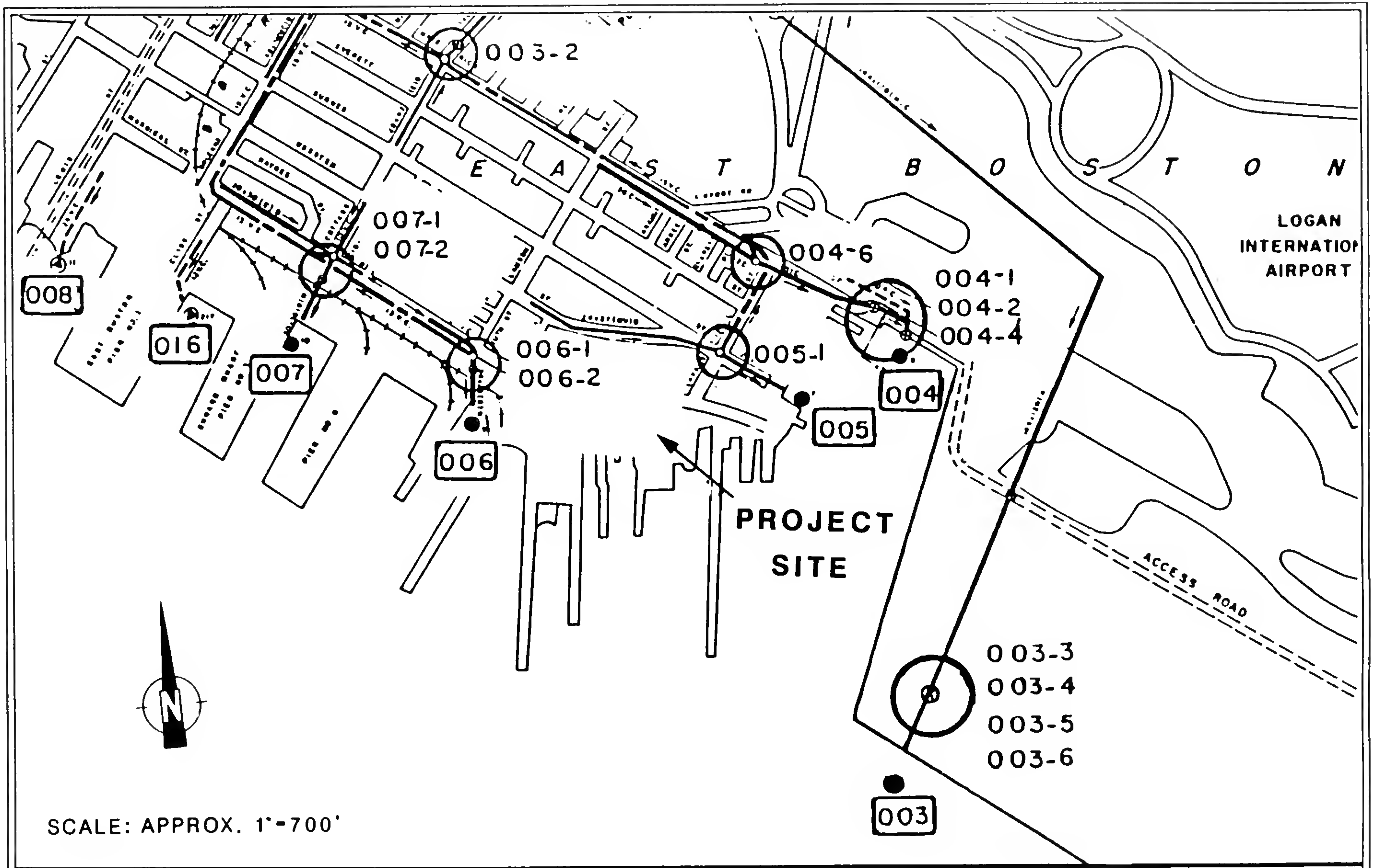

FIGURE 6.3-3
COMBINED SEWER OVERFLOWS IN PROJECT AREA
SOURCE: COMBINED SEWER OVERFLOW PROJECT.
INNER HARBOR AREA FACILITIES PLAN, MDC.
PREPAREDB BY O'BRIEN AND GERE

CSOs have been found to be a significant contributor to Boston Harbor water quality problems. The Draft EIR did not state that CSO treatment facilities "will be constructed" but rather, to address the problem, "past studies have proposed the construction of CSO treatment facilities."* The three CSO treatment facilities proposed in East Boston are as follows:

- Bird Island Flats Swirl Concentrator Facility and Conduit
- East Boston Western Waterfront Swirl Concentrator Facility
- Lexington Beach Swirl Concentrator Facility

The Bird Island Flats Facility would treat wastewater from CSOs in the southern waterfront area, including the CSO most likely to be affected by the project, CSO No. 006. A conduit would be constructed to collect wastewater from CSO nos. 003-007 (see Figure 6.3-3), to discharge to a treatment facility located near the existing CSO no. 003 on Bird Island Flats. Under the original schedule, this facility was given higher priority than the other East Boston CSO treatment facilities with construction due to start about 1988. Further, the DEIR stated that "MWRA is reportedly in the process of re-examining the earlier studies, and no new construction date is currently available."

The 1986 report by CH2M Hill referred to in the MWRA comment has been reviewed. The report has recommended that control of the Inner Harbor wet weather overflows be deferred until the entire Inner Harbor planning area is restudied. Further, the report indicates that siting conflicts exist for the Bird Island Flats Facility. As a result, it seems unlikely that wet weather overflows from the East Boston Branch Sewer will be treated in the near future.

It should be noted, however, that the CH2M Hill Report also indicated that "there may be little or no actual benefits associated with control of wet weather overflow within the Inner Harbor."** Nevertheless, to address the issue that a reduction in CSO overflows in East Boston may enhance the beneficial use of the Inner Harbor, the proponent is proposing to mitigate wet weather flows as discussed in Section 7.4.

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* Combined Sewer Overflow Project - Inner Harbor Facilities Plan, prepared for MDC by O'Brien & Gere, December, 1982.

** "Technical Memorandum 1-2, Facilities Plans Review: Review of Past Planning for Boston Harbor CSO Controls," prepared for MWRA, prepared by CH2M Hill, June 3, 1986, p. 43.

6.3.7 Sewer Capacity Evaluation

The full-flow capacity of the BWSC local 12" sewer and the MWRA East Boston Branch Sewer has been estimated based on data available from BWSC. A summary of this capacity analysis is found in Table 6.3-3. The detailed analysis is included as Table 6.3-4. Existing peak dry weather flow for a No-Build case at various points along the system have been added to the projected peak dry weather flow (PDWF) from this project and other proposed projects to compare with the sewers' capacity (see Table 6.3-5).

Table 6.3-3 has been revised to include the future peak dry weather flows (PDWF) from several planned projects including the Boston Marine Works project, Clippership Wharf project, and the Lobster Pier project. These planned projects have an estimated combined peak dry weather flow of 0.28 MGD. For comparison, the No-Build PWDF along Bremen Street/Chelsea Street ranges from 2.25 MGD to 10 MGD.

The capacity analysis indicates adequate capacity for PDWF conditions, with the project, with the exception of one minor segment of the EBBS. This segment is not considered to be significant in terms of overall sewer dry weather flow capacity.

The capacities calculated are based on the assumption that the sewers are largely unobstructed by sediment. The assumption of low sediment levels is considered representative of future conditions once the new pump station is in operation. The EBBS has been reported to contain considerable sediment deposits due to stagnant conditions caused by flow through the siphon under Chelsea Creek.

The extent and depth of the sediments is presently not well quantified, but cleaning of the sediments is planned by MWRA. A schedule for cleaning is not presently available primarily due to difficulties caused by the presence of some sediments tested as hazardous. Until the new pumping station is on-line, any removed sediments would likely be replaced by new sediment due to continued stagnant conditions. The start up of the new East Boston Pumping Station in January, 1989 will limit sedimentation in the EBBS, since both dry and wet weather flows from the EBBS will be discharged directly to the pump station. There will no longer be any need to flow through the Chelsea Creek siphon, so stagnant conditions will be alleviated.

The projected deficiency in a short segment of 24" sewer on Bremen Street, as indicated in the DEIR (p. 6-31), is not considered significant. The 75-foot long sewer on Bremen Street at the intersection of Porter Street, has an estimated capacity of 4.6 MGD. The future No-Build (1990) peak dry weather flow (PDWF) has been estimated to be about 5.15 MGD (See FEIR Table 6.3-5). The projected Build case with this project (1990) PDWF is conservatively

TABLE 6.3-3

SEWER ROUTE CAPACITY VS. DEMAND ANALYSIS SUMMARY

EAST BOSTON SHIPYARD TO EAST BOSTON PUMPING STATION

Location	Sewer Size (Inches)	Sewer Length(ft)	Full Flow Capacity+ (MGD)	Total Peak Dry Weather Flow (1990 Build)++ (MGD)
Marginal St. (BWSC Sewer)*	12	1,100	1.0	0.07
Marginal St. (MWRA Sewer)**	12	850	1.1	0.24
Marginal St. to Orleans St.	15	1,790	1.6	0.76
Orleans St. to Bremen St.	18	1,510	2.6	2.58
Bremen St.	24	75	4.6	5.48
Bremen St.	36x41	1,220	17	8.46
Bremen St. to Chelsea St.	36x41	3,190	13	10.3
Chelsea St.	36.5x42	1,030	15	10.3
Chelsea St.	40.5x45.5	530	20	10.3
TOTAL LENGTH		11,295		

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* BWSC - Boston Water and Sewer Commission.

** MWRA - Massachusetts Water Resources Authority, East Boston Branch Sewer.

\+ From Table 6.3-4.

++ From Table 6.3-5.

TABLE 6.3-4

SEWER ROUTE CAPACITY ANALYSIS

EAST BOSTON SHIPYARD TO EAST BOSTON PUMPING STATION

(PEAK DRY WEATHER FLOW CONDITIONS)

SEGMENT	EQUIVALENT PIPE DIA. (inches)	INVERT ELEV. (ft)	SEGMENT LGTH. (ft)	SLOPE (ft/ft)	CAPACITY (MGD)	EXISTING PK. FLOW (MGD)	PROJECT PK. FLOW (MGD)	TOTAL PK. FLOW (MGD)
3 - 6	12	9.00	550	0.0015	0.76	0.02	0.05	0.07
6 - 006-2	12	8.20	550	0.0040	1.27	0.02	0.05	0.07
006-2 - 006-3	12	6.00	25	0.1200	6.93	0.02	0.05	0.07
006-3 - 22	12	3.00	425	0.0024	0.97	0.04	0.05	0.09
22 - 007-3	12	2.00	400	0.0020	0.89	0.04	0.05	0.09
007-3 - 58	15	1.20	180	0.0022	1.71	0.40	0.05	0.45
58 - 61	15	0.80	510	0.0018	1.52	0.40	0.05	0.45
61 - 64	15	-0.10	620	0.0016	1.46	0.40	0.05	0.45
64 - 67	15	-1.10	480	0.0019	1.57	0.40	0.05	0.45
67 - 003-10	18	-2.00	580	0.0019	2.57	2.12	0.05	2.17
003-10 - 17	18	-3.10	460	0.0022	2.75	2.12	0.05	2.17
17 - 15	18	-4.10	470	0.0019	2.59	2.12	0.05	2.17
15 - 003-15	24	-5.00	75	0.0013	4.64	4.86	0.05	4.91
003-15 - 20	39	-5.10	610	0.0020	20.56	7.68	0.05	7.73
20 - 22	39	-6.30	610	0.0008	13.27	7.68	0.05	7.73
22 - 24	39	-6.80	630	0.0008	13.06	9.44	0.05	9.49
24 - 164	39	-7.30	330	0.0006	11.41	9.44	0.05	9.49
164 - 166	39	-7.50	600	0.0010	14.66	9.44	0.05	9.49
166 - 167	39	-8.10	400	0.0005	10.37	9.44	0.05	9.49
167 - 1	39	-8.30	330	0.0009	13.98	9.44	0.05	9.49
1 - 3	39	-8.60	550	0.0007	12.50	9.44	0.05	9.49
3 - 4	39	-9.00	350	0.0009	13.57	9.44	0.05	9.49
4 - 94	40	-9.30	300	0.0007	12.80	9.44	0.05	9.49
94 - 015-4	40	-9.50	730	0.0011	16.42	9.44	0.05	9.49
015-4 - 80	44	-10.30	530	0.0009	19.64	9.44	0.05	9.49
80	44	-10.80						
TOTAL LENGTH			11295					

NOTE: Segment identification (i.e., manhole number, pipe size, invert elevation and segment length from BWSC Wastewater System Maps (25M, 26M, 27M, 28N, 29N). Capacity calculated using Manning's Equation with a coefficient of roughness of 0.015 (fair condition brick or vitrified clay).

TABLE 6.3-5

SEWER ROUTE DEMAND ANALYSIS (PEAK DRY WEATHER FLOW-1990)

EAST BOSTON SHIPYARD TO EAST BOSTON PUMPING STATION

Location	Sewer Size (Inches)	No-Build* PDWF(mgd)	Other Projects** PDWF(mgd)	Boston Marine Works+ PDWF(mgd)	Total PDWF(mgd)
Marginal St. (BWSC Sewer)	12	0.02	--	0.05	0.07
Marginal St. (MWRA Sewer)	12	0.05	0.14	0.05	0.24
Marginal St. to Orleans St.	15	0.43	0.28	0.05	0.76
Orleans St. to Bremen St.	18	2.25	0.28	0.05	2.58
Bremen St.	24	5.15	0.28	0.05	5.48
Bremen St.	36x41	8.13	0.28	0.05	8.46
Bremen St. to Chelsea St.	36x41	10.0	0.28	0.05	10.3
Chelsea St.	36.5x42	10.0	0.28	0.05	10.3
Chelsea St.	40.5x45.5	10.0	0.28	0.05	10.3

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* The No-Build 1990 peak dry weather flow (PDWF) estimate is based on hydraulic analyses from the "East Boston Pumping Station Facilities Planning Project Report," prepared for MDC, prepared by Metcalf & Eddy, March, 1983. The existing conditions (1980) reported by Metcalf & Eddy have been adjusted by removal of the project site past user's (BSC) PDWF and by factoring up to 1990 by applying population projections reported in "Population Projections for Boston ... to the Year 2000" by Boston Redevelopment Agency, August, 1985.

** Other projects include Lobster Pier (presently undefined, use a conservative assumption based on the anticipated traffic volumes reported in the ENF, published August 9, 1985: 150 Vehicles/Day x 2 person/vehicle x 15 gpd/person x 3.0 peaking factor = 13,500 gpd), and Clippership Wharf (from the DEIR published September, 1986: 14,000 gpd peak dry weather flow).

\+ From Table 6.3-2.

estimated to increase to about 5.48 MGD. For the No-Build case PDWF of 5.15 MGD, this section would surcharge about 1/4", while for the Build case (1990) at 5.48 MGD, it would surcharge about 1/2". The top of this section of sewer is about 20 feet below grade so there is no likelihood of any impact on lateral connections (there do not appear to be any according to BWSC maps)*.

Also, the elevation of the closest regulator (to allow relief to a CSO) is about 6 feet above the top of this section of sewer. Therefore, this section will not be a cause of dry weather overflows. No significant impact is expected from this relatively short segment of sewer. This section is not considered a significant constraint in the East Boston Branch Sewer.

6.3.8 Stormwater

The existing project site is served by a number of separate stormwater drains that discharge to the harbor. Catch basins on Marginal Street discharge to the 12" combined sewer discussed previously. The existing site storm drainage is shown on Figure 6.3-4. Approximately 75% of the existing site land area and roof tops (i.e., not including piers or other wet areas such as the graving dock), drain to the harbor either by storm drains or overland flow. There will be no increase in existing impervious area, so there will be no increase in site storm drainage.

Stormwater from the site paved surfaces is expected to contain pollutants typical of urban commercial and industrial areas. These pollutants such as oil and grease, heavy metals, suspended solids, etc., are deposited on the impervious surface by leakage and emissions from vehicles and by atmospheric deposition. Typical levels of these pollutants are shown in Table 6.3-6. These levels are those expected to be measured at the outlet of the stormwater collection system.

The best practical treatment to control these pollutants is a combination of sedimentation and gravity oil and grease separation. The typical method of applying this treatment technology in stormwater collection system design is the use of catch basins for sedimentation and MDC oil and gas separators for gravity separation. In catch basins, suspended solids settle to the bottom

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* BWSC does not foresee a problem with lateral connections in this area, Personal Communication with Mr. Frank DePaola, November, 1987.

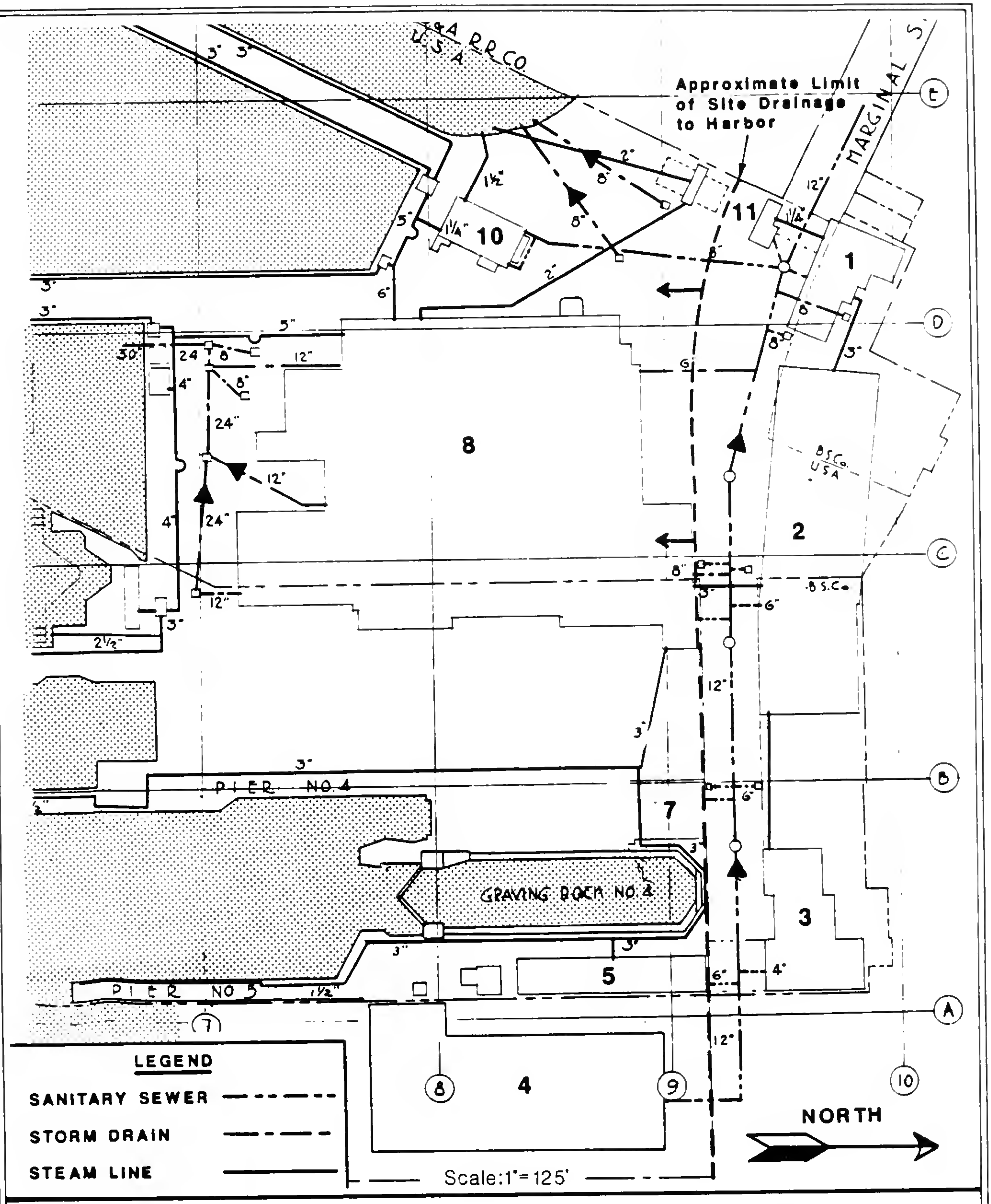

FIGURE 6.3-4 PROJECT SITE STORM DRAINAGE

Source: Bethlehem Steel - Utilities Dwg.-revised 1954

TABLE 6.3-6

TYPICAL STORMWATER RUNOFF POLLUTANT LEVELS*

Median EMC** Concentration (mg/L)

By Land Use Category

	Durham, NH Parking Lot (1 Acre)	Woburn, MA Industrial Park (18 Acres)	Nationwide Median Commercial	Nationwide Median Urban
Total Suspended Solids (TSS)	38	37	69	100
Biological Oxygen Demand (BOD)	13	--	9.3	9
Chemical Oxygen Demand (COD)	79	--	57	65
Total Phosphorous(TP)	0.17	0.09	0.20	0.33
Total Kjeldahl Nitrogen (TKN)	1.8	1.9	1.2	1.5
Copper (Cu)	0.10	--	0.03	0.03
Lead (Pb)	0.15	--	0.10	0.14
Zinc (Zn)	0.43	--	0.23	0.16
Oil & Grease (O&G)	--	--	13.1***	--

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* Data from "Results of Nationwide Urban Runoff Program - Volume I - Final Report," USEPA, PB84-185552, December, 1983.

** Event Mean Concentration (i.e., storm event mean).

*** Data from "Oil and Grease in Stormwater Runoff," Stenstrom, M.A. et. al., Assoc. Bay Area Gov't, Berkeley, CA, 1982.

of the catch basin. Oil and gas separators are essentially in-line tanks or basins that have a submerged outlet. The outlet is submerged so that the oil and grease remains floating. Periodic skimming of the liquid surface of the oil and gas separator and removal of accumulated solids from the catch basins are required to maintain effectiveness.

Catch basins have been found to effectively remove 60-97% of suspended solids, 10-56% of chemical oxygen demand (COD) and 54-88% of biological oxygen demand (BOD) by monitoring of typical catch basins in Boston in 1979-1980.* Another study found that on an annual basis, typical catch basins would retain pollutants as follows:**

	% Material Retained	
Pollutant	Low	High
Total Solids	42.1	75.0
Volatile Solids	15.2	25.5
BOD_5	15.5	26.6
COD	7.5	14.1
Kjeldahl Nitrogen	14.6	27.4
Nitrates	9.5	17.1
Phosphates	2.3	6.0
Total Heavy Metals	37.4	64.4
Total Pesticides	13.6	29.7

The East Boston Marine Works site will include approximately 2 acres of parking areas. It is proposed that all of the parking area to the south of Marginal Street (about 85% of the total parking areas) will be equipped with catch basins and oil/gas separators. Parking to the north of Marginal Street (remaining 15% of parking area) will be primarily in existing paved areas adjacent to the existing buildings. These areas are presently served by catch basins that

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* "Evaluation of Catchbasin Performance for Urban Stormwater Pollution Control," USEPA, PB83-217745, June, 1983.

** "Catchbasin Technology Overview and Assessment," USEPA, EPA-600/2-77-051, May, 1977.

discharge to the combined sewer on Marginal Street. All outdoor paved industrial areas of the site will also be equipped with catch basins and oil/gas separators. Proper spill control and countermeasure procedures will be employed to prevent the introduction of hazardous industrial products and wastes into the drainage system. This is discussed further in Section 6.2, Hazardous Materials.

All catch basins on-site will be cleaned as needed (probably 1-2 times/year) to maintain effective performance. Oil/gas separators will be checked periodically (2 times/year) and skimmed as needed to remove accumulated oil, grease, and gas.

6.3.9 Sewage Disposal Volume Reduction

The potential impacts from sewage generation at the Boston Marine Works will be minimized in several ways. First, the proponent is installing new plumbing fixtures, such as limited flow faucets and toilets and low-flow showers. These fixtures will replace existing facilities. Grease traps will be installed and maintained in all kitchen areas.

Second, it should be noted that this project is a rehabilitation and change in facility use that will result in a net decrease in sewage generation (i.e., about 55%) from the previous use. Although this in itself represents significant mitigation, the proponent is further proposing to offset the project's impacts on wet weather flows to the combined sewer on Marginal Street. The roof of the Machine Shop, Building Nos. 12 and 32, presently drain to the combined sewer on Marginal Street. So thirdly, the proponent will separate this source of stormwater from the combined sewer, which will in effect offset the sewage flow from the entire project during wet weather. The peak sewage flow from the project is about 0.047 MGD. Building Nos. 12 and 32 have combined a roof area of about 26,000 sf, so that even with a conservatively low average rainfall intensity of 0.2 in/hr, the peak runoff rate from the buildings would be about 0.074 MGD.* This is more than adequate to offset the impact of the entire project sanitary flow on the combined sewer during wet weather conditions. The clean water from the rooftop drainage will be discharged to Boston Harbor rather than to the combined sewer where it could cause combined sewer overflows.

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* By the Rational Method, Q = Cia, where Q = peak runoff rate (cfs), C = runoff coefficient (0.95 for rooftops), i = average rainfall intensity (in/hr), and a = drainage area (acres). (For i = 0.2 in/hr, a = 26,000 SF/(43,500 SF/ac) = 0.60 acres: Q = 0.95 x 0.2 x 0.60 x 0.646 MGD/cfs = 0.074 MGD.

6.4 Traffic/Transportation

6.4.1 Introduction

Subsequent to the submission of the Draft EIR, further project planning resulted in the re-definition and refinement of the various land uses and characteristics associated with the proposed project. In addition, detailed information on the characteristics of uses (i.e., densities, average vehicle occupancies and modal splits) of the existing project provided a basis upon which to factor these local characteristics into the estimation of future project trip-making. This combination of refined project planning and supplemental, existing, site-specific use characteristics has resulted in a reduction in projected average daily and peak hour traffic to/from the project site, compared with estimates presented in the Draft EIR. The following presents the results of the Final EIR analysis.

The location of the Boston Marine Works site together with the proposed level of activities make transportation issues a significant concern for the proposed project. The multi-use development has potential to generate increased traffic and parking demands, yet East Boston is sensitive to additional transportation demands given the existing limitations of the street system and relatively high demands that already exist. Accordingly, extensive attention has been paid to potential transportation impacts.

Figure 6.4-1 shows the location of the project site in relation to the East Boston community. The traffic impact study area, also indicated on Figure 6.4-1, is bounded by Porter Street on the north, Logan airport property, on the east, and Meridian Street on the west. Primary vehicle access to the study area is via local East Boston Streets to/from:

1) Sumner and Callahan Tunnels (Boston proper and areas south, west, and northwest),
2) Meridian Street and the McCardle Bridge (Chelsea and areas north), and
3) Route 1A to Revere and areas northeast.

As indicated in previous sections, the proposed project involves the reuse and renovation of the existing buildings, cranes, piers and surrounding shipyard area. The development will be divided into two phases. The development program is outlined in Table 3-1. The Phase 1 and Phase 2 development levels have been revised from the levels presented in the Draft EIR, to take into account supplemental project planning which has occurred subsequent to the submittal of the Draft EIR.

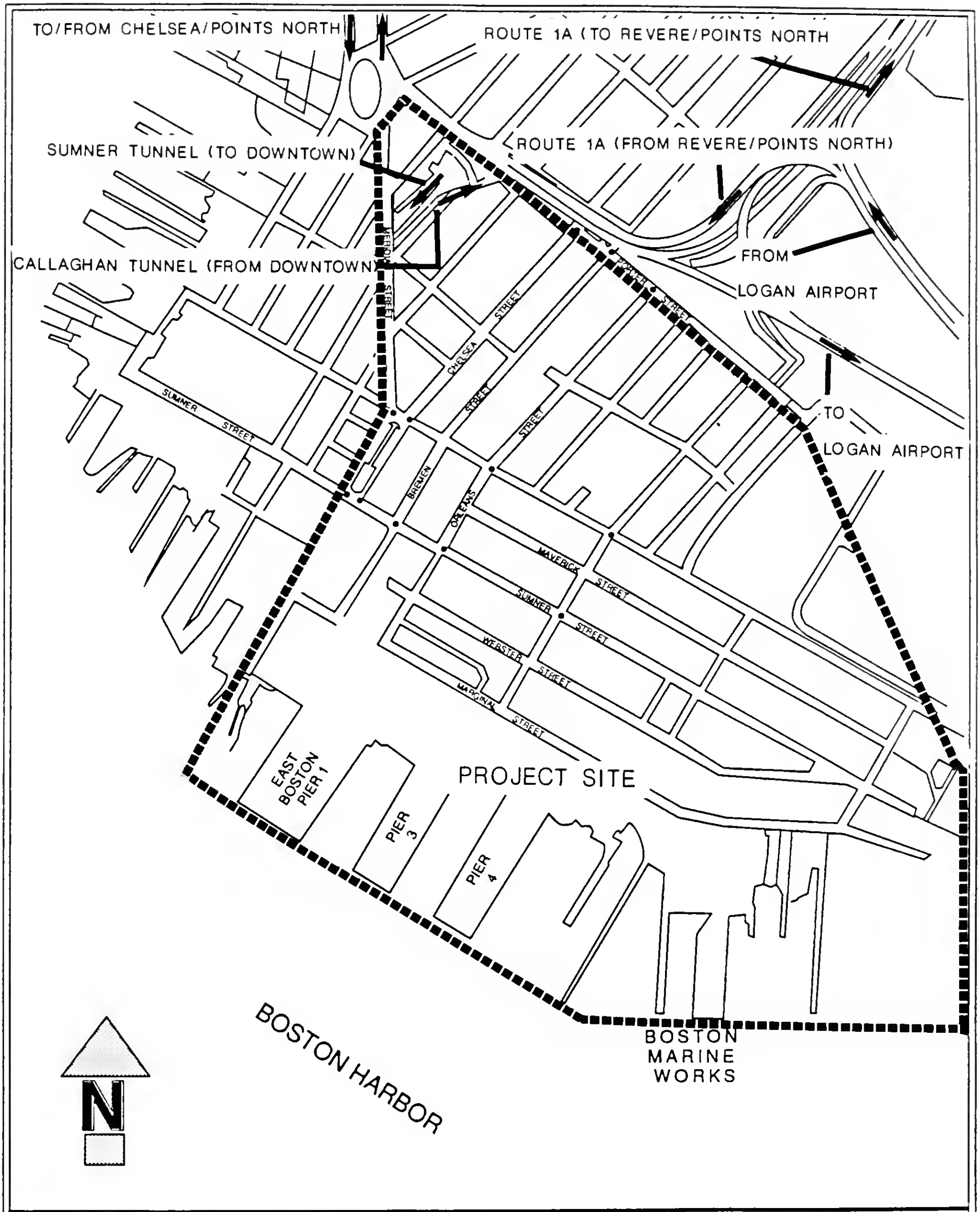

FIGURE 6.4-1 TRAFFIC IMPACT STUDY AREA

The major focus of this analysis is on the expected project impacts resulting from additional vehicle trips generated by Phase 1 and Phase 2 of this project. Traffic associated with:

1) The East Boston Pier and Clippership Wharf projects which have already been filed with MEPA,
2) Other known developments in the area not subject to MEPA, and
3) normal regional growth

is also included in the evaluation. As required by the MEPA scoping certificate, routes and volumes of traffic to and from the Boston tunnels were analyzed.

Traffic operations for existing conditions, and for a future (1990) No-Build Alternative (i.e., future condition without the proposed project) have been evaluated. In addition, operations for a 1990 condition with Phase 1 of the project and with both Phases 1 & 2 of the project are presented. These are the same analysis conditions assessed in the Draft EIR. Mitigating measures to reduce potential traffic-related impacts at locations experiencing peak hour operational deficiencies were also identified.

6.4.2 Existing Study Area Conditions

East Boston Neighborhood Access Overview

The Boston Marine Works is located adjacent to the Jeffries Point residential neighborhood. Local streets through the neighborhood provide site access. It is therefore appropriate to recognize neighborhood access and parking needs while looking at the project's access demands. As information for the Jeffries Point neighborhood by itself is not readily available, a summary of travel information for the East Boston residential community as a whole is presented as being broadly representative. This data is taken from 1980 U.S. Census* data, and from a 1985 Housing Survey** conducted by the Boston Redevelopment Authority. Access and parking information on several matters of interest are presented for East Boston, along with the same data for the City of Boston as a whole:

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* Source: Diversity and Change in Boston's Neighborhoods, 1970-1980, Boston Redevelopment Authority, 1985.

** Source: BRA/NDFA Household Survey, Boston Redevelopment Authority, 1985.

1980 Journey-to-Work Data	East Boston Residential Use	All-Boston Residential
* Drive alone or carpool	50.4 %	47.3 %
* Use public transportation	37.2 %	33.7 %
* Walk or other	12.4 %	19.0 %

Car Ownership			East Boston Residential Use	All-Boston Residential
1985	•	Cars per household	0.72	0.86
	•	Percent households with any car	55 %	61 %
	•	Cars per car-owning household	1.30	1.40
Ownership change		1970-1980	+ 9 %	+ 11 %
		1980-1985	+ 1 %	+ 18 %

Parking

1985	•	% households with one or more cars parked onstreet	43 %	N/A
	•	% car-owning households with one or more cars parked on-street	78 %	N/A

The above data indicates that East Boston residents, although owning fewer cars per household than the City of Boston average, are just as dependent on the auto for travel to work. At the same time, residents are more dependent upon public transit than the population of the City as a whole. The apparent discrepancy is explained by the fact that a smaller fraction of the East Boston population walks to work.

The data show a very high dependence on curb space for parking. As a result, local residents are very sensitive to any competing demands from non-residential parking. This characteristic also tends to restrict available roadway widths for through traffic. It may also account, in part, for a smaller increase in car ownership in East Boston than the City as a whole.

Roadway Characteristics

The traffic analysis conducted consists of an evaluation of traffic operations at ten key intersections within the study area. These locations are identified below, and also illustrated in Figure 6.4-2.

1) Chelsea Street @ Porter Street;
2) Porter Street @ Orleans Street;
3) Sumner Street @ Maverick Square;
4) Bremen Street @ Porter Street;
5) Maverick Street @ Maverick Square;
6) Maverick Street @ Orleans Street;
7) Maverick Street @ Cottage Street;
8) Sumner Street @ Bremen Street;
9) Sumner Street @ Orleans Street; and
10) Sumner Street @ Cottage Street.

The following is a description of the physical conditions at the above intersections.

1) Chelsea Street at Porter Street is a two-lane, two-way facility with parking along both approaches. The total pavement width along Chelsea Street is approximately 40 feet. Porter Street is approximately 30 feet wide and is one-way eastbound at this location.

2) Porter Street at Orleans Street forms a standard four-way intersection. Traffic at this location is controlled by an actuated signal. Orleans Street provides for two lanes of bi-directional traffic and has parking on both sides. North of Porter Street is the driveway to the East Boston Stadium and the MBTA station. South of Porter Street, Orleans Street is 36 feet wide. Porter Street is 34 feet wide and provides for two lanes of traffic (one in each direction). East of Orleans Street there is parking on both sides of this facility.

3) Sumner Street at Maverick Square forms the southern portion of Maverick Square. The traffic configuration is somewhat out of the ordinary in that traffic flows clockwise around this Square (instead of the conventional counterclockwise). The traffic flow pattern has been instituted to better accommodate bus loading/off loading operations by positioning bus doors on the transit station island.

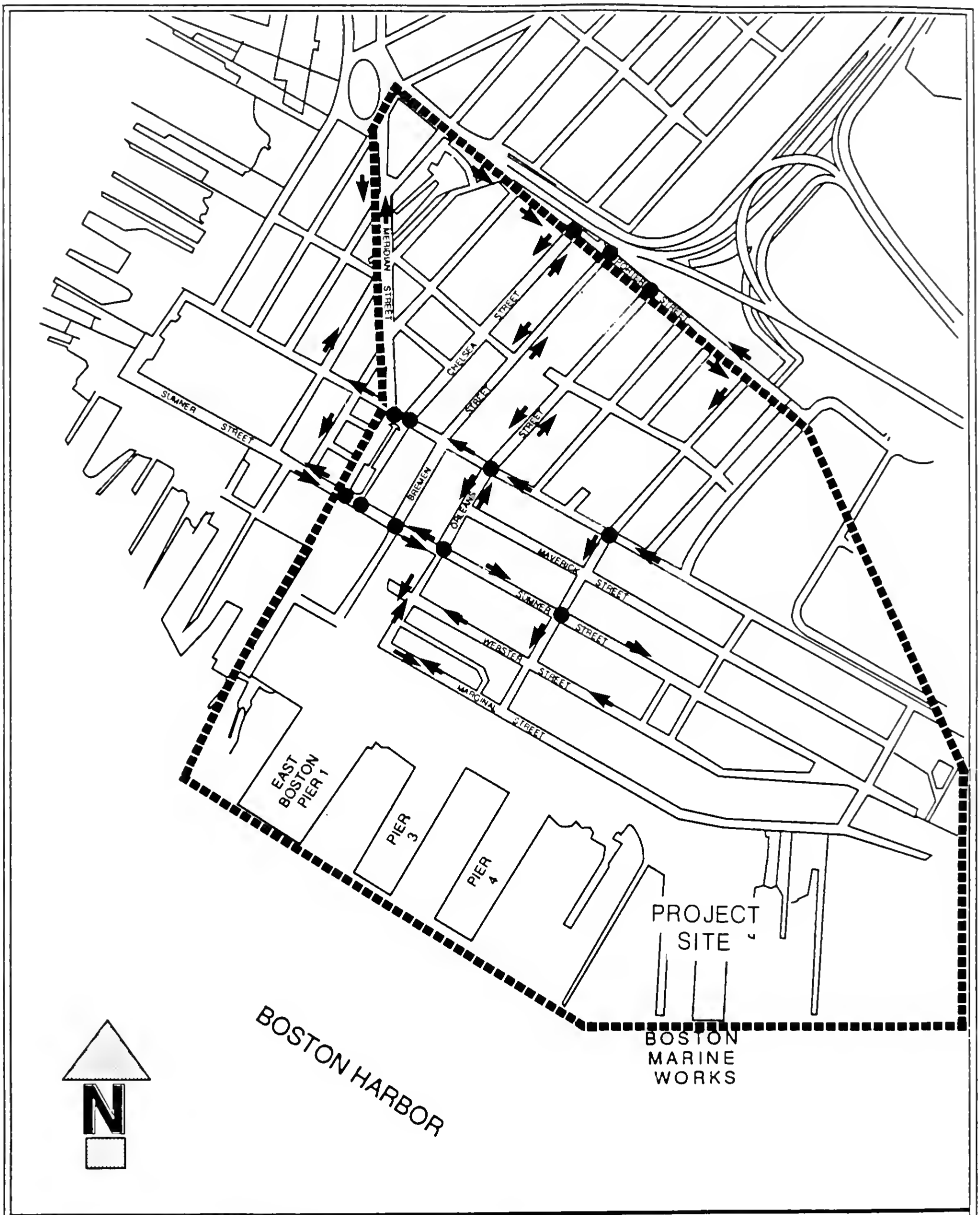

FIGURE 6.4-2

STUDY AREA INTERSECTION LOCATIONS

STUDY AREA BOUNDARY

DIRECTION OF TRAVEL

STUDY AREA INTERSECTION LOCATION

Chelsea Street is 33 feet wide and traffic flows southbound with parking allowed on one side of this facility. Meridian Street is one-way northbound and has a pavement width of 32 feet. There is also parking on one side of this street. Sumner Street provides for two-lanes of travel (one in each direction). Each lane is 29 feet wide and parking is allowed on both sides of street, except between Chelsea and Meridian Streets.

4) Porter Street at Bremen Street forms a five-way segment which includes a connector roadway to Visconti Way. Porter Street west of Bremen is approximately 34 feet wide and is one-way eastbound, while Porter Street east of the intersection provides for bi-directional traffic flow. Bremen Street provides for two directional traffic flow and is approximately 25 feet wide.

5) Maverick Street at Maverick Square forms the northern portion of Maverick Square. The clockwise flow around the square occurs here as well as at Sumner Street. Chelsea Street is approximately 35 feet wide and is one-way southbound, while Meridian Street is, to the south of Maverick Street, one-way northbound and is also approximately 35 feet wide. Meridian Street north of Maverick Square provides two-lane, bi-directional flow. Maverick Street is one-way westbound and Chelsea Street north of the Square is two-way. Traffic at this location is partially controlled by stop signs with certain movements seemingly operating on a first come, first served basis.

6) Maverick Street at Orleans Street is a stop sign controlled intersection with the stop sign along the Orleans Street approach. Maverick Street is one-way westbound, with a pavement width of approximately 34 feet. Vehicles park along both sides of Maverick Street, leaving one wide travel lane for through, right and left-turning vehicles. Orleans Street is a two-lane, two-way travel way, with parking along both sides. The travel way is approximately 34 feet wide.

7) Cottage Street at Maverick Street is a stop sign controlled intersection with only two approach roadways. Cottage Street is one-way southbound, with approximately 30 feet of pavement. Parking is permitted along both sides of Cottage Street. Maverick Street is one-way westbound, and is approximately 34 feet wide at this location. Parking is also permitted along both sides of Maverick Street.

8) <u>Sumner Street at Bremen Street</u> is stop sign controlled with stop signs along the two Bremen Street approaches. The Sumner Street eastbound approach at this location is approximately 21 feet wide, with parking; and the Sumner Street westbound approach is approximately 24 feet wide, with parking. The pavement width along Bremen Street varies from approximately 32 feet, north of Sumner Street, to 46 feet, south of Sumner Street, with parking on both sides. Only one travel lane is provided for each approach at this intersection.

9) <u>Sumner Street at Orleans Street</u> is also stop sign controlled, with stop signs along the Orleans Street approaches. Orleans Street provides two lanes of travel, one in each direction, with approach widths of approximately 15 feet. Parking is permitted along both sides of Orleans Street. Sumner Street west of Orleans Street is a two-lane, two-way facility. East of Orleans Street, Sumner Street is one-way eastbound (out of the intersection). The Sumner Street eastbound approach at this location is approximately 22 feet, with parking.

10) <u>Cottage Street at Sumner Street</u> has only two approaches, since Sumner Street at this location is one-way eastbound and Cottage Street is one-way southbound. A single stop sign controls traffic along the Cottage Street southbound approach, which is approximately 25 feet wide, with parking on both sides. Sumner Street is approximately 32 feet wide, with parking on both sides.

<u>Mass Transportation Characteristics</u>

The existing MBTA mass transportation serving the general study area is shown in Figure 6.4-3. The Blue Line's Maverick Station is located approximately 3,000 feet from the project, at Maverick Square. MBTA bus route 120 currently provides service along Sumner and Maverick Streets, within close proximity to the project site. As previously indicated, the East Boston residential community is more reliant on public transportation as a mode of travel to work than the population of the City of Boston as a whole.

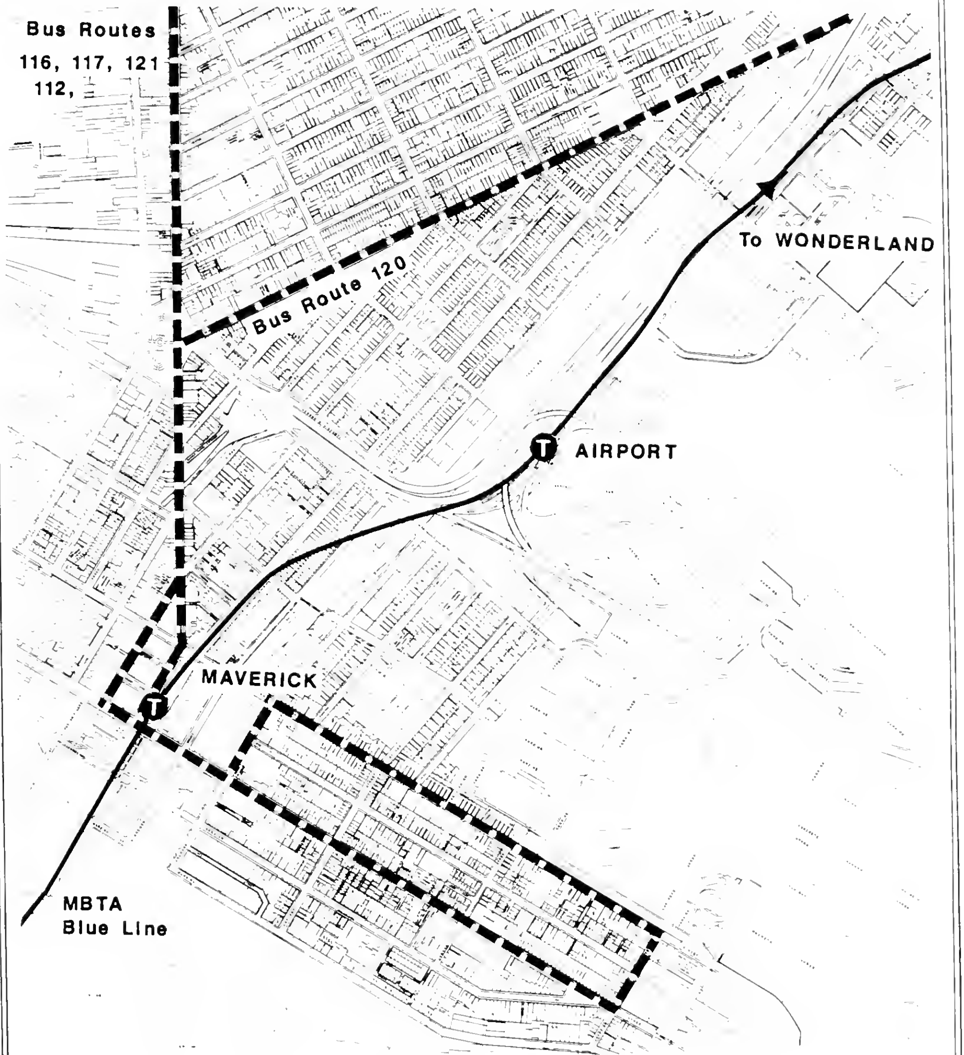

FIGURE 6.4-3 MASS TRANSPORTATION

HMM ASSOCIATES, INC.

Parking

Although parking bans and restrictions exist at various locations throughout the study area, on-street parking provides the major supply to local businesses and area residents. In fact, parking is prevalent on both sides of all key roadways serving the project site. A summary of existing permitted and restricted on-street parking areas on selected streets is presented in Figure 6.4-4.

Existing Traffic Volume Levels

Existing (1987) traffic volume levels were developed based upon a recent DEIR submitted for the Clippership Wharf Project.* Supplemental spot counts were taken during July 1987, seasonally adjusted, and used to update the 1986 data to typical 1987 conditions. This resulted in an increase of approximately 2 percent from the 1986 baseline data presented in the Clippership Wharf DEIR. Massport Logan Ground Access Study counts (1985) were also used for confirmation.

The resultant 1987 AM and PM peak hour turning movement counts for study area intersection locations are presented in Figures 6.4-5 and 6.4-6, respectively.

Safety

Historic accident data for area-wide intersections were summarized in a recent (1986) DEIR*. These data indicated a relatively low accident rate at 26 intersection locations analyzed within the general area. This information is presented in Table 6.4-1, for the applicable study area intersections. A review of this table indicates the relatively low incidence of accidents at study area intersections.

Traffic Operations

Traffic operations were analyzed according to standard procedures and practices outlined in the "Highway Capacity Manual".** Traffic signal cycle lengths were initially obtained from signal permits, and then manually checked in the field during peak hour operations.

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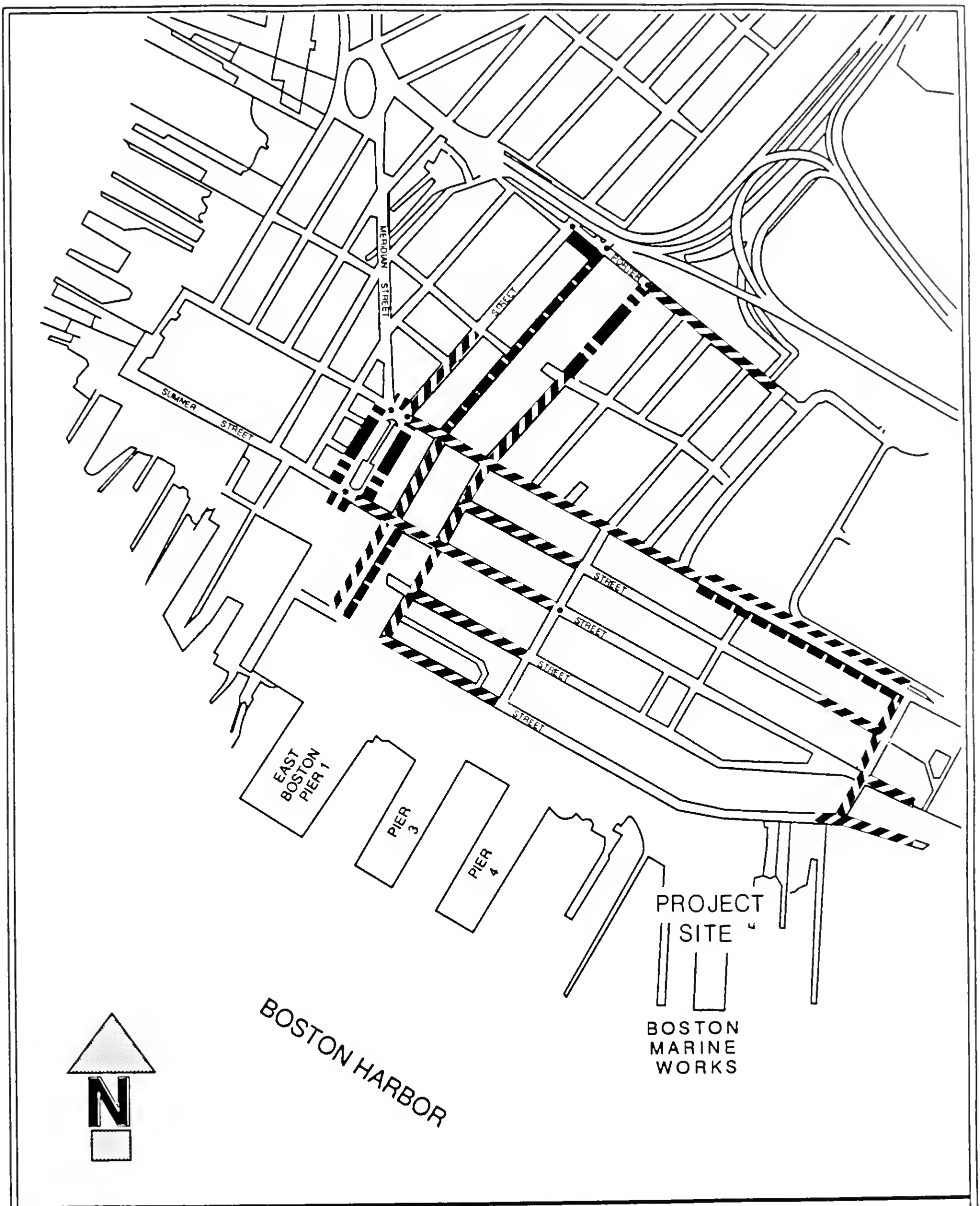
* Clippership Wharf DEIR, Skidmore, Owings & Merrill, et al., September 1986.

** "Highway Capacity Manual," Transportation Research Board Special Report 209, 1985.



NO PARKING

2 HOUR LIMIT OR RESIDENT STICKER 8am-6pm

RESIDENT STICKER ONLY

2 HOUR LIMIT

FIGURE 6.4-4 PERMITTED AND RESTRICTED ON-STREET PARKING AREAS

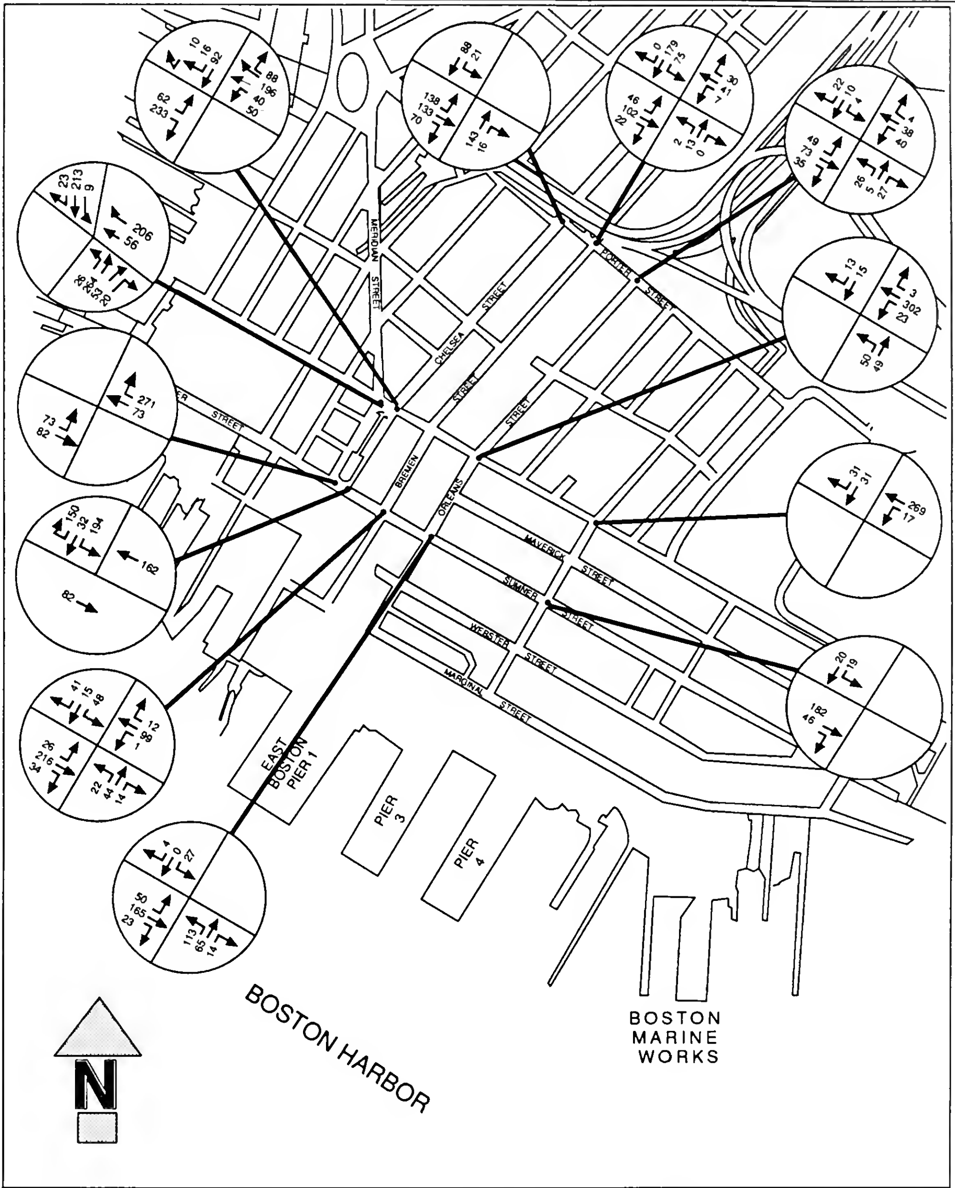


FIGURE 6.4-5
EXISTING (1987) AM PEAK HOUR VOLUMES

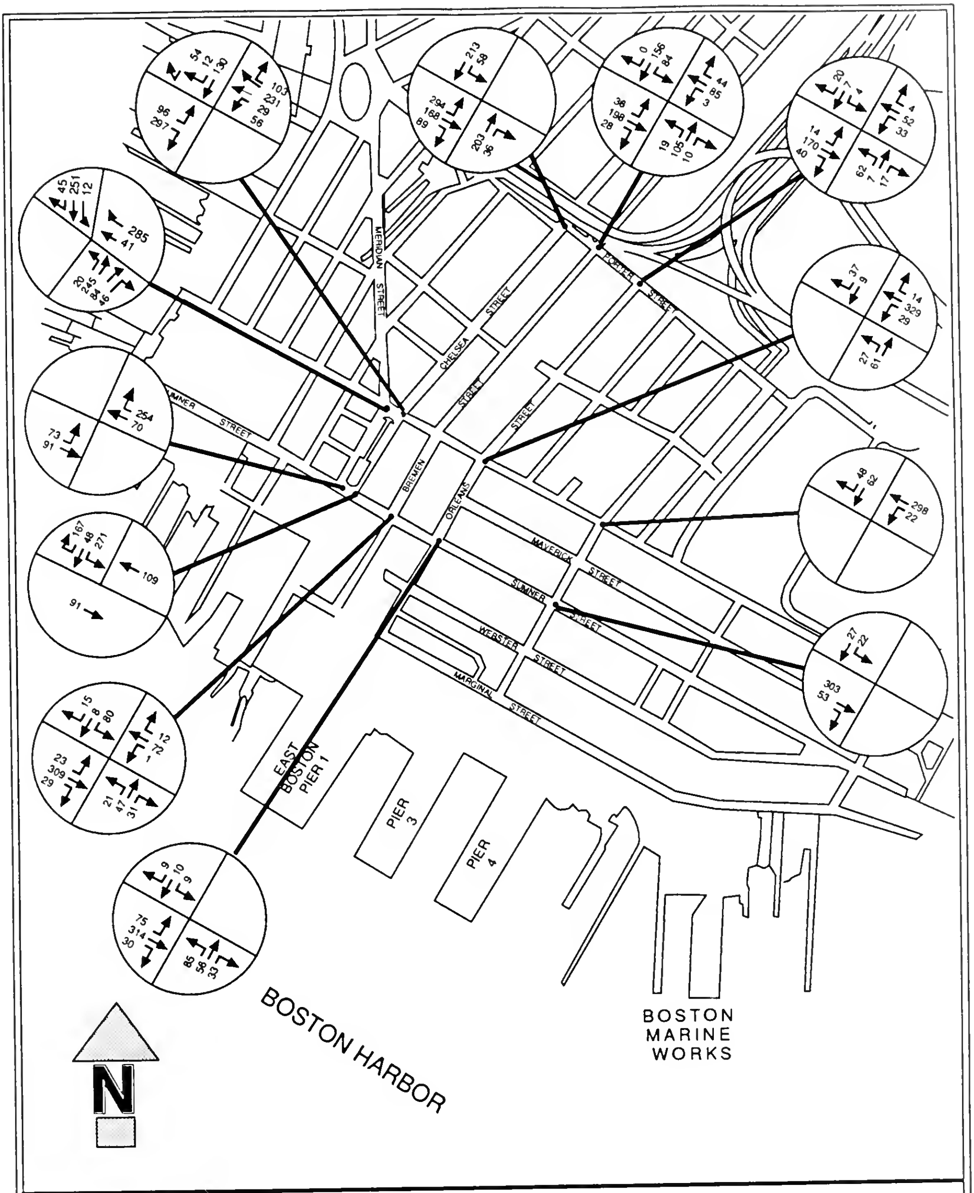


FIGURE 6.4-6
EXISTING (1987) PM PEAK HOUR VOLUMES

TABLE 6.4-1

ACCIDENT HISTORY*

		Fatalities	Personal Injuries	Property Damage Only
1)	Chelsea Street @ Porter Street	0	3	0
2)	Porter Street @ Orleans Street	0	0	2
3)	Sumner Street @ Maverick Square	0	0	0
4)	Bremen Street @ Porter Street	0	0	0
5)	Maverick Street @ Maverick Square	0	1	1
6)	Maverick Street @ Orleans Street	0	1	2
7)	Maverick Street @ Cottage Street	0	2	1
8)	Sumner Street @ Bremen Street	0	0	1
9)	Sumner Street @ Orleans Street	0	0	1
10)	Sumner Street @ Cottage Street	0	0	1

---

* Source: Clippership Wharf DEIR, Skidmore, Owings & Merril, et al., September 1986; data is for calendar year 1983 - the latest data available from the Registry of Motor Vehicles.

The efficiency of traffic operations at a location is measured in terms of Level of Service (LOS). LOS refers to the quality of traffic flow along roadways and at intersections. It is described in terms of Levels A through F, where A represents the best possible conditions and F represents forced-flow or failing conditions. Generally, LOS C or better is considered acceptable, although under certain urban conditions, LOS D may also be acceptable.

At signalized intersections, LOS is defined in terms of average approach delays. For unsignalized intersections, reserve capacities are used to determine LOS. These measures are discussed briefly below; Table 6.4-2 summarizes their inter-relationships.

Average delay measures the mean stopped delay experienced by vehicles entering a signalized intersection during the peak hour period. Average delay is measured for each individual vehicular movement and for the intersection as a whole. The LOS provided decreases with increasing average delays.

Service levels at unsignalized intersections are defined in terms of reserve capacity. The reserve capacity is the unused capacity of the minor approach (usually the stop or yield sign controlled approach). This measure, defined in passenger cars per hour, indicates how many more vehicles using an individual approach would be required to bring the facility to capacity.

The previously presented 1987 AM and PM peak hour volumes were used to calculate existing operational levels of service. Table 6.4-3 presents these LOS determinations for the study area intersections. At the present time, AM and PM peak hour traffic operations are generally at acceptable levels at all locations analyzed. All locations except Maverick Street @ Maverick Square are at LOS C, or better, during both AM and PM peak hour periods. During the PM peak hour, operations at the unsignalized intersection of Maverick Street at Maverick Square are at LOS D.

Existing Conditions Summary

Traffic and parking problems in many portions of the East Boston community have become significant in recent years, particularly in the vicinity of Logan Airport and the Tunnels. Adding to the problem are the numerous park and fly lots, air freight companies, and car rental agencies which have infringed upon the East Boston neighborhood due to its proximity to Logan Airport.

Limited parking supply in the Jeffries Point and Maverick Square areas have also resulted in general parking supply shortages in the vicinity of the proposed project. This has resulted in significant reductions in potential vehicle carrying capacities along primary study area roadways, particularly along Orleans, Bremen and Chelsea Streets. This situation has resulted, in large part, due to a concerted effort by the City of Boston to restrict additional lot and garage

TABLE 6.4-2

LEVEL OF SERVICE (LOS) DESIGNATIONS*

Category	Description	Delay Range** (Seconds per vehicle	Reserve*** Capacity (Passanger Cars Per Hour)
LOS A:	Describes a condition of free flow, with low volumes and relatively high speeds. There is little or no reduction in maneuverability due to the presence of other vehicles, and drivers can maintain their desired speeds. Little or no delays result for side street motorists.	0.00-0.50	400
LOS B:	Describes a condition of stable flow, with desired operating speeds relatively unaffected, but with a slight deterioration of maneuverability within the traffic stream. Side street motorists experience short delays.	5.1-15.0	300-399
LOS C:	Describes a condition still representing stable flow, but speeds and maneuverability begin to be restricted. The general level of comfort begins to deteriorate noticeably at this level. Motorists entering from side streets experience average delays.	15.1-25.0	200-299
LOS D:	Describes a high-density traffic condition approaching unstable flow. Speeds and maneuverability become more seriously restricted, and the driver experiences a poor level of comfort. Side street motorists may experience long delays.	25.1-40.0	100-199
LOS E:	Represents conditions at or near the capacity of the facility. Flow is usually unstable, and freedom to maneuver within the traffic stream becomes extremely difficult. Very long delays may result for side street motorists.	40.1-60.0	0-99
LOS F:	Describes forced flow or breakdown conditions with queuing along critical approaches. Operating conditions are highly unstable as characterized by erratic vehicle movements along each approach.	60.1 or greater	N/A

* Source: "Highway Capacity Manual", Transportation Research Board Special Report 209; National Research Council, 1985.

** Delay ranges relate to the mean stopped delay incurred by all vehicles entering the intersection and do not consider the effects of traffic signal coordination. This criteria is intended for use in the evaluation of signalized intersections.

*** Reserve capacity refers to the unused capacity of the minor approach, on a per lane basis. This criteria is limited to use in the evaluation of unsignalized intersections.

TABLE 6.4-3

1987 EXISTING PEAK HOUR INTERSECTION

OPERATION SUMMARY

SIGNALIZED INTERSECTIONS

	Intersection	Movement	AM Peak Hour LOS	AM Peak Hour Average Delay	PM Peak Hour LOS	PM Peak Hour Average Delay
1)	Chelsea Street	EB	B	10.0	B	15.0
	@ Porter Street	NB	B	13.3	B	14.4
		SB	B	12.9	C	15.2
		OVERALL	B	11.3	B	14.9
2)	Porter Street	EB	B	5.3	B	5.6
	@ Orleans Street	WB	A	5.0	A	5.0
		NB	B	10.3	B	10.7
		SB	B	10.0	B	9.9
		OVERALL	B	6.6	B	6.8
3A)	Sumner Street	EB	B	13.1	B	13.2
	@ Maverick Square	WB	C	15.7	B	14.9
	(Meridian Street)	NB	-	-	-	-
		SB	B	8.0	B	8.0
		OVERALL	B	14.7	B	14.1
3B)	Sumner Street	EB	B	11.8	B	12.0
	@ Maverick Square	WB	B	12.1	B	11.7
	(Chelsea Street)	NB	-	-	-	-
		SB	B	10.8	B	11.4
		OVERALL	B	11.2	B	11.5

TABLE 6.4-3

1987 EXISTING PEAK HOUR INTERSECTION

OPERATION SUMMARY (Continued)

UNSIGNALIZED INTERSECTIONS

	Intersection	Movement	AM Peak Hour LOS	AM Peak Hour Reserve Capacity	PM Peak Hour LOS	PM Peak Hour Reserve Capacity
4)	Bremen Street	EB L	A	1,071	A	1,017
	@ Porter Street	WB L	A	1,052	A	951
		NB	A	670	A	451
		SB	A	475	B	315
5A)	Maverick Street	NB	A	539	A	493
	@ Maverick Square	SB	C	232	D	155
	(Meridian Street)					
5B)	Maverick Street	EB L	A	797	A	728
	@ Maverick Square	WB L	A	896	A	828
	(Chelsea Street)	SB	B	366	C	232
6)	Maverick Street	WB L	A	1,165	A	1,161
	@ Orleans Street	NB	A	526	A	514
		SB	A	687	A	680
7)	Maverick Street	WBL	A	1,171	A	1,166
	@ Cottage Street	NB	A	1,083	A	1,083
		SB	A	691	A	606
8)	Sumner Street	EB L	A	1,047	A	1,080
	@ Bremen Street	WB L	A	929	A	846
		NB	A	549	A	519
		SB	A	545	B	391
9)	Sumner Street	EB L	A	1,137	A	1,112
	@ Orleans Street	NB	A	593	A	466
		SB	A	653	A	651
10)	Sumner Street	NB	A	864	A	749
	@ Cottage Street	SB	A	685	A	568

uses in East Boston. Implementation of the Limited Parking District zoning ordinance in 1983 and, more recently, the residential permit parking program are examples of this effort.

6.4.3 1990 No-Build Alternative

No-Build Alternative Traffic Volume Levels

The No-Build Alternative presented in the Draft EIR included traffic associated with the Clippership Wharf Project and an increase in baseline traffic volumes of 2 percent per year, to account for normal local and regional traffic growth. This 2 percent annual growth would account for anticipated increases in traffic due to local development in the area, excluding the Clippership Wharf Project, and normal regional growth.

Traffic associated with the Massport Lobster Pier and Park Project was not included in the Draft EIR, since a detailed traffic analysis for that project has not yet been prepared. Although an ENF was prepared for the Lobster Pier and Park Project in 1985, project planning has not proceeded to the EIR stage. More detailed traffic analysis is currently being sponsored by Massport. This analysis will be included in the submittal of an EIR for that project during 1988. MEPA's comments on the Draft EIR, however, indicated that the Lobster Pier and Park traffic should be included in the No-Build Analysis, since that project had previously filed an ENF. Accordingly, the 1990 No-Build condition presented in the Draft EIR has been revised to include traffic associated with the Massport Lobster Pier and Park Project, as defined in the ENF submittal.

The 1990 No-Build traffic levels were developed by:

1) Increasing the existing (1987) traffic volumes by an annual rate of 2 percent per year, to account for normal local and regional background growth; and

2) Adding new traffic to the area associated with the Clippership Wharf project and the Massport Lobster Pier and Park project previously filed with MEPA.

Vehicular traffic associated with these developments is estimated to be as follows*:

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* Developed from data presented in "Clippership Wharf DEIR", Skidmore, Owings & Merril, et al., September 1986.

	AM Peak Hour			PM Peak Hour			ADT		
	In	Out	Total	In	Out	Total	In	Out	Total
• Lobster Pier & Park Project									
-- Park	12	0	12	0	18	18	48	48	96
-- Lobster Terminal	33	7	40	7	32	39	135	135	270
• Clippership Wharf Project	40	100	140	110	40	150	800	800	1,600
TOTAL	85	107	192	117	90	207	983	983	1,966

The resultant 1990 No-Build traffic volumes for AM and PM peak hour periods are presented in Figures 6.4-7 and 6.4-8, respectively.

No-Build Alternative Traffic Operations

The 1990 No-Build traffic volume levels were used to calculate peak hour operations at key study area intersections. Table 6.4-4 presents the results of these calculations for each intersection studied. The 1990 No-Build condition, AM and PM peak hour operations will be at acceptable levels of service (i.e., LOS C or better) at all locations except Maverick Street at Maverick Square. At this unsignalized location, AM peak hour operations will be at LOS D and PM peak hour operations will be at LOS E (capacity). Vehicle delays will be noticeably increased at this location, compared to existing conditions during both AM and PM peak hour periods.

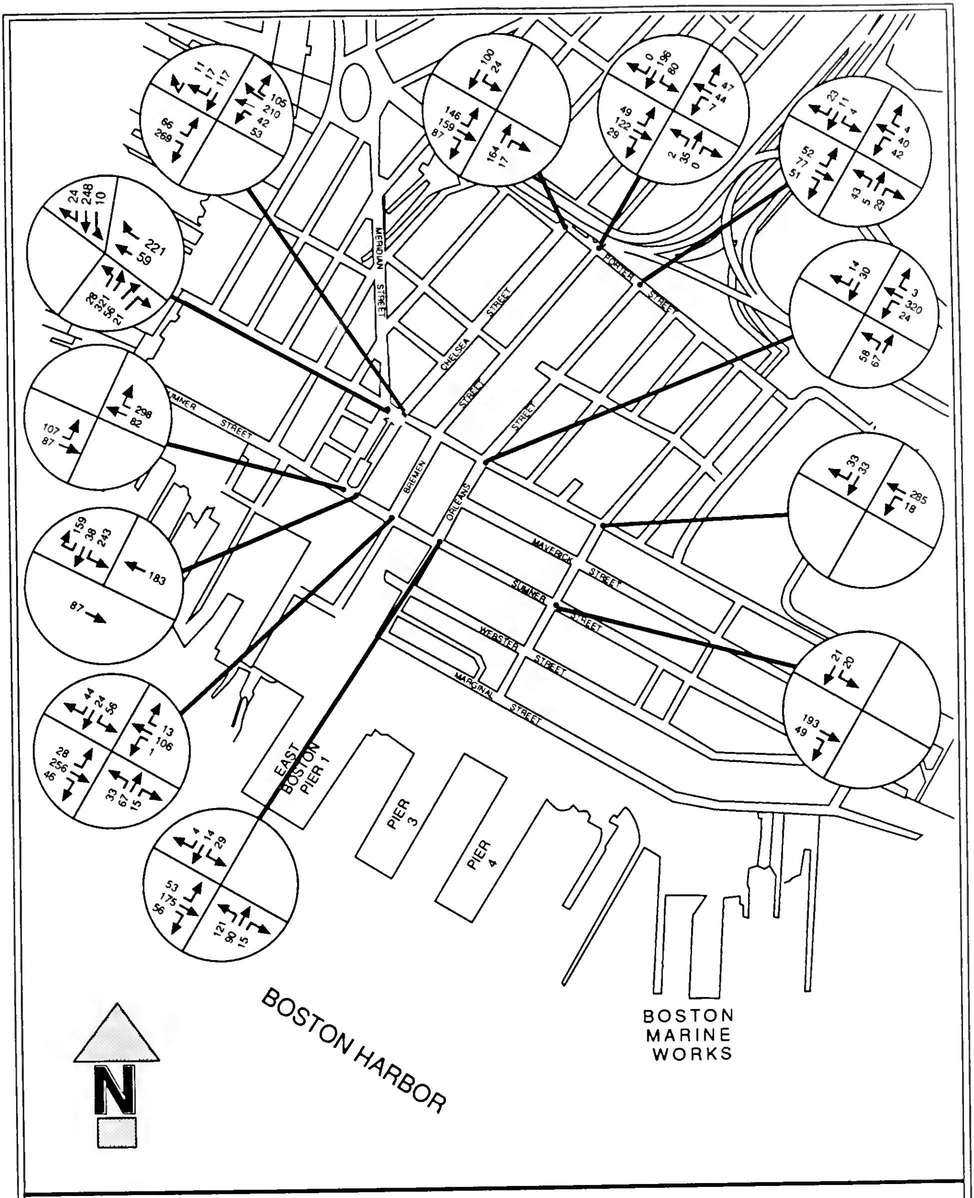

FIGURE 6.4-7
1990 NO-BUILD ALTERNATIVE: AM PEAK HOUR

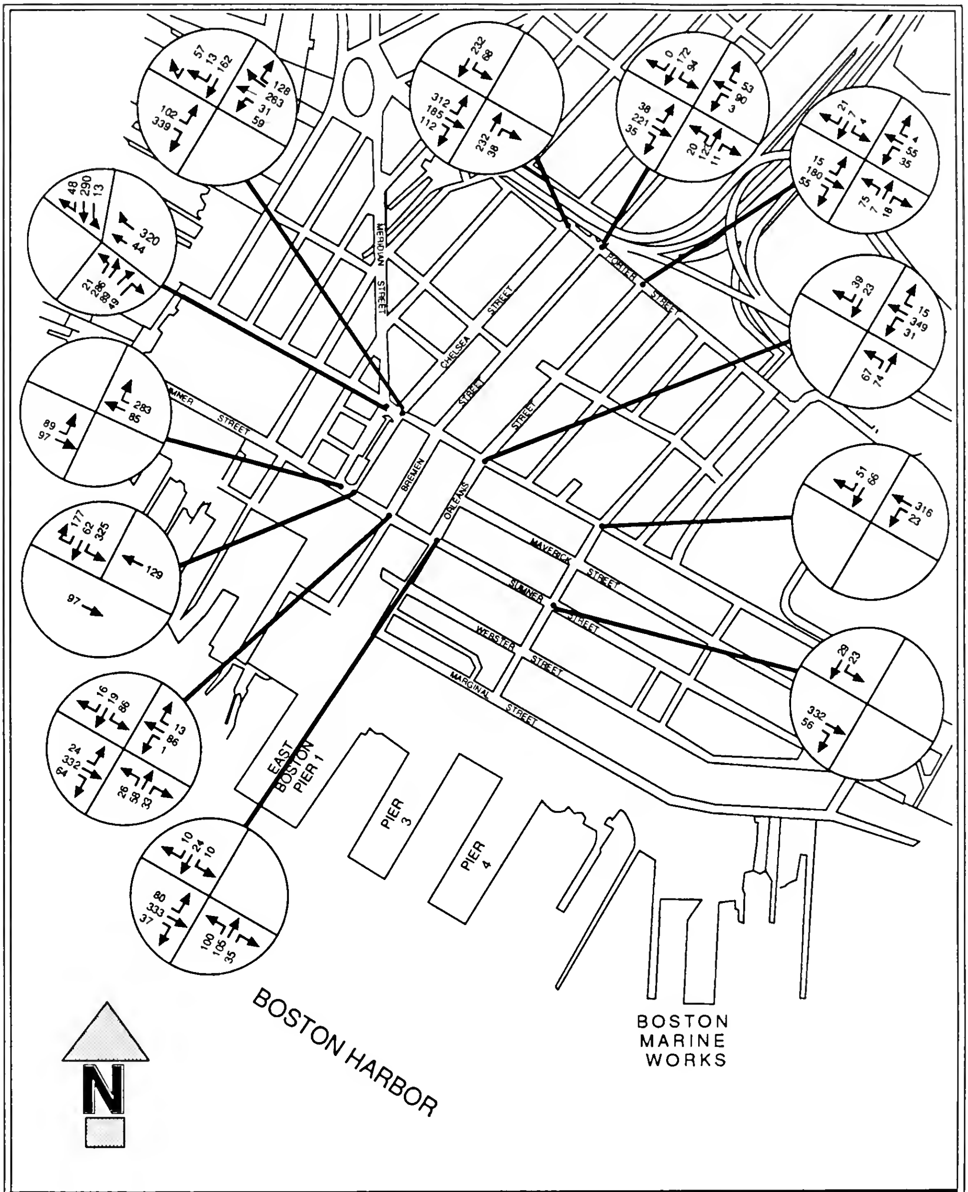

FIGURE 6.4-8
1990 NO-BUILD ALTERNATIVE: PM PEAK HOUR

TABLE 6.4-4

1990 NO-BUILD ALTERNATIVE PEAK HOUR INTERSECTION OPERATIONS SUMMARY

SIGNALIZED INTERSECTIONS

Intersection	Movement	AM Peak Hour LOS	AM Peak Hour Average Delay	PM Peak Hour LOS	PM Peak Hour Average Delay
1) Chelsea Street @ Porter Street	EB	B	10.9	C	19.0
	NB	B	13.7	B	14.9
	SB	B	13.1	C	16.2
	OVERALL	B	12.0	C	17.3
2) Porter Street @ Orleans Street	EB	B	5.3	B	5.7
	WB	A	5.0	B	5.1
	NB	B	10.7	B	10.8
	SB	B	10.0	B	9.9
	OVERALL	B	6.8	B	7.0
3A) Sumner Street @ Maverick Square (Meridian Street)	EB	B	14.6	B	14.0
	WB	C	17.2	C	16.1
	NB	-	-	-	-
	SB	B	8.0	B	8.0
	OVERALL	C	16.1	B	15.2
3B) Sumner Street @ Maverick Square (Chelsea Street)	EB	B	12.0	B	12.0
	WB	B	12.1	B	11.8
	NB	-	-	-	-
	SB	B	11.2	B	12.1
	OVERALL	B	11.5	B	12.0

TABLE 6.4-4

1990 NO-BUILD ALTERNATIVE PEAK HOUR INTERSECTION

OPERATION SUMMARY (Continued)

UNSIGNALIZED INTERSECTIONS

	Intersection	Movement	AM Peak Hour LOS	AM Peak Hour Reserve Capacity	PM Peak Hour LOS	PM Peak Hour Reserve Capacity
4)	Bremen Street	EB L	A	1,046	A	1,000
	@ Porter Street	WB L	A	1,023	A	921
		NB	A	638	B	395
		SB	A	410	C	246
5A)	Maverick Street	NB	A	454	A	407
	@ Maverick Square	SB	D	119	E	49
	(Meridian Street)					
5B)	Maverick Street	EB L	A	802	A	699
	@ Maverick Square	WB L	A	873	A	789
	(Chelsea Street)	SB	B	323	D	146
6)	Maverick Street	WB L	A	1,164	A	1,157
	@ Orleans Street	NB	A	476	A	411
		SB	A	638	A	622
7)	Maverick Street		----	NOT IMPACTED	----	
	@ Cottage Street					
8)	Sumner Street	EB L	A	1,036	A	1,062
	@ Bremen Street	WB L	A	879	A	795
		NB	A	455	A	449
		SB	A	451	B	317
9)	Sumner Street	EB L	A	1,145	A	1,107
	@ Orleans Street	NB	A	533	B	368
		SB	A	605	A	577
10)	Sumner Street		----	NOT IMPACTED	----	
	@ Cottage Street					

6.4.4 1990 Build Alternative

The majority of renovation work will occur during Phase 1 of the proposed project. The development components of Phase 1 include office use, light industrial/warehouse space, heavy industrial/storage space and food service use. Vehicle trip generation and parking generation statistics from several sources were used to determine traffic and parking demands of the project. The primary sources of this information, however, are the Institute of Transportation Engineers (ITE) Trip Generation and Parking Generation manuals.* The trip generation data were used to estimate the likely magnitude of peak hour and daily traffic to be generated by the Boston Marine Works project. These estimated trips were then assigned to the study area roadway network to identify local traffic operation impacts of the project. In addition, these statistics were used to estimate peak weekday versus peak weekend project parking demands.

Project Trip Generation

As previously indicated, further project planning conducted subsequent to the submission of the Draft EIR, and the additional consideration of existing user characteristics (i.e., land use densities, average vehicle occupancies and modal splits) have resulted in a reduction of average daily and peak hour project trip estimates, compared to those presented in the Draft EIR.

Vehicle trip generation data from the new Institute of Transportation Engineer's (ITE) Trip Generation Manual** was used in this Final EIR to estimate the magnitude of peak hour and daily traffic to be generated from Phase I and Phase 2 of the project. The new Trip Generation Manual was not available when the Draft EIR was completed, but since it is based on a data base approximately 50 percent larger than the data base utilized in the edition used for the Draft EIR, the trip generation estimates were re-calculated using the new, updated rates. The ITE base rates were adjusted according to procedures outlined in the Trip Generation Manual to take into account site-specific characteristics of the Boston Marine Works project.

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* Trip Generation (Fifth Edition), Institute of Transportation Engineers, 1987; and Parking Generation (Interim Report), Institute of Transportation Engineers, 1985.

** Trip Generation Manual, Institute of Transportation Engineers, Fifth Edition, 1987.

The ITE average employment densities of 4.8 employees per 1,000 GSF for office use, 2.3 employees per GSF for light industrial warehouse use, and 1.84 employees per GSF for food service use were considered appropriate for this project. However, heavy industrial/storage uses are expected to result in an employee density similar to the existing employee density of 0.35 employees per 1,000 GSF, versus the much higher average employee density of 1.6 employeesper 1,000 GSF presented by ITE. In addition, the modal use of existing employees (approximately 25 percent transit/walk mode) was applied to the ITE rates for office, light industrial/warehouse, heavy industrial/storage and food service uses. (Note that this is lower than the average of East Boston residents as a whole, where 37.2% use transit and an additional 12.4% walk to work.) Also an average vehicle occupancy of 1.42 persons per vehicle was used to appropriately adjust the ITE trip generation rates. Rates associated with marine, retail, restaurant, and marina uses were not adjusted from the ITE base trip generation rates, since employment densities, modal splits, and vehicle occupancies would not be expected to vary from the ITE average due to the location of the property.

The above factors were taken into account to appropriately project future vehicular traffic associated with the proposed project. It should be noted that although factors were taken into account to appropriately account for existing site specific land use densities, vehicle occupancies and modal splits, each of the future uses were treated independently with no "credit" given to the potential for shared trips (i.e., trips made to the marina which may also use the restaurant, or office workers who may be patrons of the restaurant, etc.) As such, the vehicle trips are expected to be conservative (i.e., represent a worse case). This is considered to be totally appropriate for analysis purposes.

The trip generation rates for the office, light industrial, heavy industrial, food service, restaurant and marine retail uses represent average annual weekday conditions. Since the marina use will vary significantly during the various seasons of the years, daily estimates have been prepared for a peak weekday seasonal condition (i.e., peak summer weekday) and an average off-season weekday condition. Both of the weekday conditions would generate total daily traffic volumes greater than that which would occur on a weekend period. Table 6.4-5 summarizes the resultant vehicle trip generation rates used for the Boston Marine Works project.

The total vehicle trip generation estimates expected under Phase 1 and Phase 2 of the proposed project are presented in Table 6.4-6 for the off-peak seasonal weekday marina use and Table 6.4-7 for the peak summer seasonal weekday marina use. Projected project generated traffic for an average weekday traffic condition with off peak seasonal weekday marina use is

TABLE 6.4-5
BOSTON MARINE WORKS ADJUSTED TRIP GENERATION RATES

	Office[1] (1000 sf)	Light[2] Industrial (1000 sf)	Heavy[3] Industrial (1000 sf)	Food[4] Service (1000 sf)	Restaurant[5] (seat)	Marine[6] Retail (1000 sf)	Marina[7] (berth)
Average Daily Traffic							
- In	5.615	2.410	0.115	1.77	1.43	5.94	0.50(1.50)*
- Out	5.615	2.410	0.115	1.77	1.43	5.94	0.50(1.50)
AM Peak							
- Enter	1.28	0.58	0.06	0.67	0.02	0.53	0.07
- Exit	0.18	0.08	0.01	0.05	0.01	0.44	0.02
PM Peak							
- Enter	0.23	0.09	0.01	0.37	0.15	0.35	0.09
- Exit	1.24	0.63	0.02	0.32	0.07	0.80	0.08

1. ITE Land Use Code 710.
2. ITE Land Use Code 110.
3. ITE Land Use Code 120.
4. ITE Land Use Code 140.
5. ITE Land Use Code 831.
6. Assumed to be 25% of ITE Land Use Code 841.
7. ITE Land Use Code 420.

* Rates not in parentheses represent an average off season weekday condition; rates in parentheses represent a peak season (i.e., summer) condition.

TABLE 6.4-6
BOSTON MARINE WORKS TRIP GENERATION SUMMARY
Average Weekday Traffic With Off Peak Seasonal Weekday Marina Use*

	Office	Light Industrial	Heavy Industrial	Food Service	Restaurant	Marine Retail	Marina	Total
PHASE 1								
Average Weekday Traffic								
- Enter	197	134	12	8	0	0	0	351
- Exit	197	134	12	8	0	0	0	351
- Total	394	268	24	16	0	0	0	702
AM Peak								
- Enter	45	32	7	3	0	0	0	87
- Exit	6	5	1	0	0	0	0	12
- Total	51	37	8	3	0	0	0	99
PM Peak								
- Enter	8	5	1	2	0	0	0	16
- Exit	44	35	2	1	0	0	0	82
- Total	52	40	3	3	0	0	0	98
PHASE 2								
Average Weekday Traffic								
- Enter	0	0	0	0	143	64	104	311
- Exit	0	0	0	0	143	64	104	311
- Total	0	0	0	0	286	128	208	622
AM Peak								
- Enter	0	0	0	0	2	6	15	23
- Exit	0	0	0	0	1	5	4	10
- Total	0	0	0	0	3	11	19	33
PM Peak								
- Enter	0	0	0	0	15	4	19	38
- Exit	0	0	0	0	7	9	17	33
- Total	0	0	0	0	22	13	36	71
PHASE 1 AND 2 TOTAL								
Average Weekday Traffic								
- Enter	197	134	12	8	143	64	104	662
- Exit	197	134	12	8	143	64	104	662
- Total	394	268	24	16	286	128	208	1,324
AM Peak								
- Enter	45	32	7	3	2	6	15	110
- Exit	6	5	1	0	1	5	4	22
- Total	51	37	8	3	3	11	19	132
PM Peak								
- Enter	8	5	1	2	15	4	19	54
- Exit	44	35	2	1	7	9	17	115
- Total	52	40	3	3	22	13	36	169

* Represents off-season (non-summer) average weekday conditions for the marina use, and average annual weekday conditions for all other uses.

TABLE 6.4-7
BOSTON MARINE WORKS TRIP GENERATION SUMMARY
Average Weekday Traffic With Peak Seasonal Weekday Marina Use*

	Office	Light Industrial	Heavy Industrial	Food Service	Restaurant	Marine Retail	Marina	Total
PHASE 1								
Average Weekday Traffic								
- Enter	197	134	12	8	0	0	0	351
- Exit	197	134	12	8	0	0	0	351
- Total	394	268	24	16	0	0	0	702
AM Peak								
- Enter	45	32	7	3	0	0	0	87
- Exit	6	5	1	0	0	0	0	12
- Total	51	37	8	3	0	0	0	99
PM Peak								
- Enter	8	5	1	2	0	0	0	16
- Exit	44	35	2	1	0	0	0	82
- Total	52	40	3	3	0	0	0	98
PHASE 2								
Average Weekday Traffic								
- Enter	0	0	0	0	143	64	313	520
- Exit	0	0	0	0	143	64	313	520
- Total	0	0	0	0	286	128	616	1,040
AM Peak								
- Enter	0	0	0	0	2	6	15	23
- Exit	0	0	0	0	1	5	4	10
- Total	0	0	0	0	3	11	19	33
PM Peak								
- Enter	0	0	0	0	15	4	19	38
- Exit	0	0	0	0	7	9	17	33
- Total	0	0	0	0	22	13	36	71
PHASE 1 AND 2 TOTAL								
Average Weekday Traffic								
- Enter	197	134	12	8	143	64	313	871
- Exit	197	134	12	8	143	64	313	871
- Total	394	268	24	16	286	128	626	1,742
AM Peak								
- Enter	45	32	7	3	2	6	15	110
- Exit	6	5	1	0	1	5	4	22
- Total	51	37	8	3	3	11	19	132
PM Peak								
- Enter	8	5	1	2	15	4	19	54
- Exit	44	35	2	1	7	9	17	115
- Total	52	40	3	3	22	13	36	169

* Represents seasonal (summer) peak weekday conditions for the marina use, and average annual weekday conditions for all other uses.

1,324 vehicles (662 vehicles in and 662 vehicles out). For an average weekday period with peak seasonal (i.e., summer) weekday marina use this could grow to 1,742 vehicles (871 vehicles in and 871 vehicles out). It should be noted, however, that this latter case would be rare. As a comparison, peak daily weekend traffic volume levels for all uses are projected to be 1,100 vehicles (500 vehicles in and 550 vehicles out), wereas average weekend levels are projected to be only 570 vehicles (285 vehicles in and 285 vehicles out).

1990 Phase 1 Trip Distribution and Traffic Assignment

The distribution of project-generated traffic was based upon information presented in a recent 1984 Massport Report* for similar land uses in the area. The following summarizes the general trip distribution by primary entry/exit corridor:

To/From	% of Total Trips
Sumner and Callahan Tunnels	50%
Route 1A/Chelsea Street - Bremen St. to Points North**	40%
Meridian Street and McArdle Bridge	10%

Project trips were assigned to local roadways based upon minimum travel time routings. The resultant traffic assignments are presented in Figures 6.4-9 and 6.4-10 for trips to and from the project, respectively.

Traffic Operations

As in the prior traffic operations analyses (Existing and 1990 No-Build), the 1990 Build traffic operations analysis utilizes standard procedures and practices outlined in the "Highway Capacity Manual".*** The measure of efficiency of traffic operations is defined in terms of Level of Service (LOS).

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* Traffic Analysis - East Boston Harborside Project, R.S. Niedowski, March 1984.
** Including approximately 5% local East Boston trips.
*** "Highway Capacity Manual", Transportation Research Board Special Report 209, 1985.

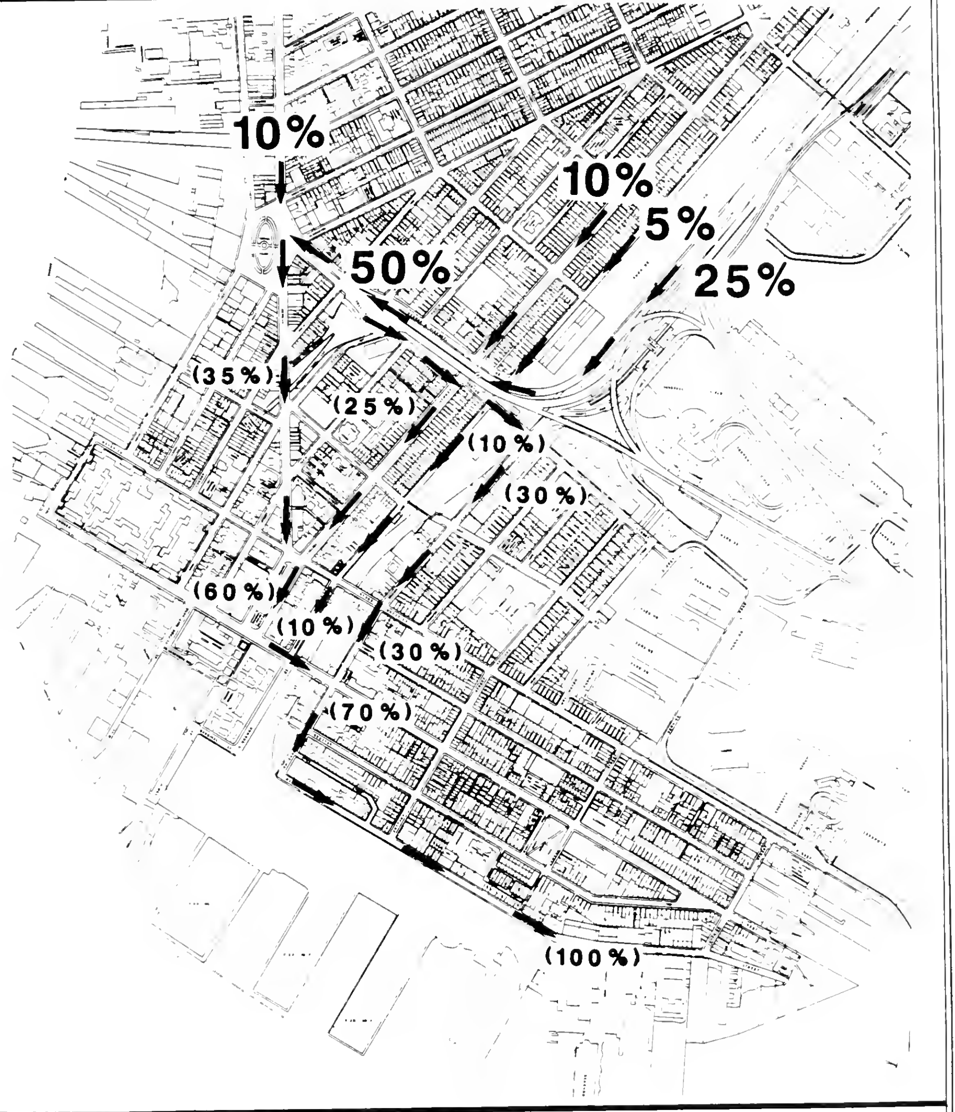

FIGURE 6.4-9 DISTRIBUTION OF PROJECT TRIPS TO THE SITE

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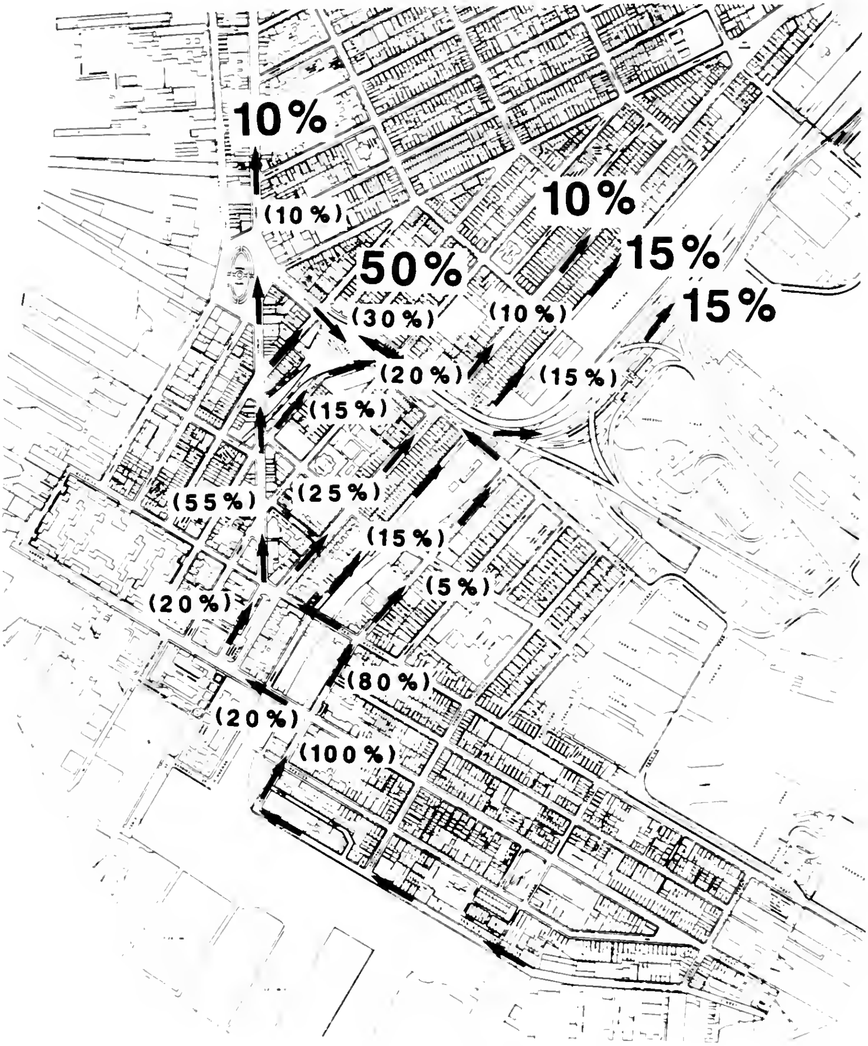

FIGURE 6.4-10 DISTRIBUTION OF PROJECT TRIPS FROM THE SITE

HMM ASSOCIATES, INC.

1990 Phase 1 Development

The previously presented trip generation data and trip distribution and traffic assignment assumptions were used to develop future (1990) traffic volume levels associated with Phase 1 of the proposed project. These volumes were added to the 1990 No-Build traffic flows. Figures 6.4-11 and 6.4-12 present the resultant 1990 Phase 1 development AM and PM peak hour volumes, respectively.

Using the 1990 Phase 1 development traffic volumes, AM and PM peak hour operations were assessed. Table 6.4-8 presents the results of this analysis for the Phase 1 development. As indicated, traffic associated with Phase 1 of the project will not appreciably impact AM or PM peak hour operations (compared to the No-Build alternative) at the intersections of:

- Chelsea Street @ Porter Street,
- Porter Street @ Orleans Street,
- Sumner Street @ Maverick Square,
- Bremen Street @ Porter Street,
- Maverick Street @ Orleans Street,
- Maverick Street @ Cottage Street,
- Sumner Street @ Bremen Street,
- Sumner Street @ Orleans Street, and
- Sumner Street @ Cottage Street.

Traffic operations at the intersection of Maverick Street and Maverick Square will be impacted during AM and PM peak hours, compared to the No-Build alternative. Operations will be at LOS E (capacity) during both the AM and PM peak hour with Phase I of the project, whereas they would to be LOS D during the No-Build AM peak hour and LOS E during the No-Build PM peak hour. It should be noted that as part of the Clippership Wharf EIR process, it has been recommended that this location be signalized, due to impacts associated with the Clippership Wharf Project and existing baseline traffic at this location.

1990 Phase 2 Development

The Phase 2 trip generation estimates were added to the previously identified 1990 Phase 1 traffic volumes to develop a 1990 full development (Phases 1 & 2) condition. These volumes are presented in Figures 6.4-13 and 6.4-14 for AM and PM peak hour periods, respectively. Table 6.4-9 summarizes study area traffic operations for the future Phase 1 and Phase 2 traffic volumes.

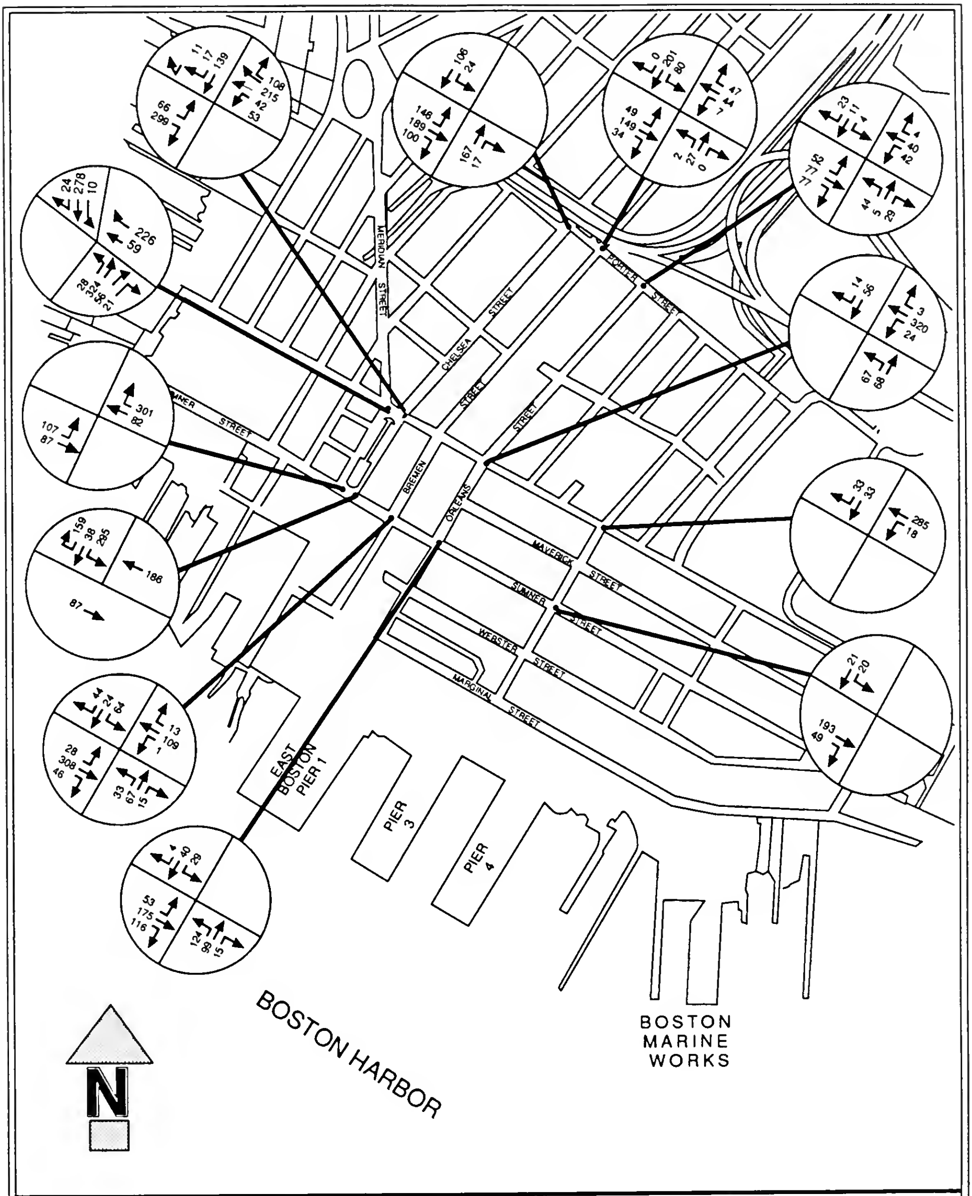

FIGURE 6.4-11
PHASE 1-BUILD ALTERNATIVE: AM PEAK HOUR

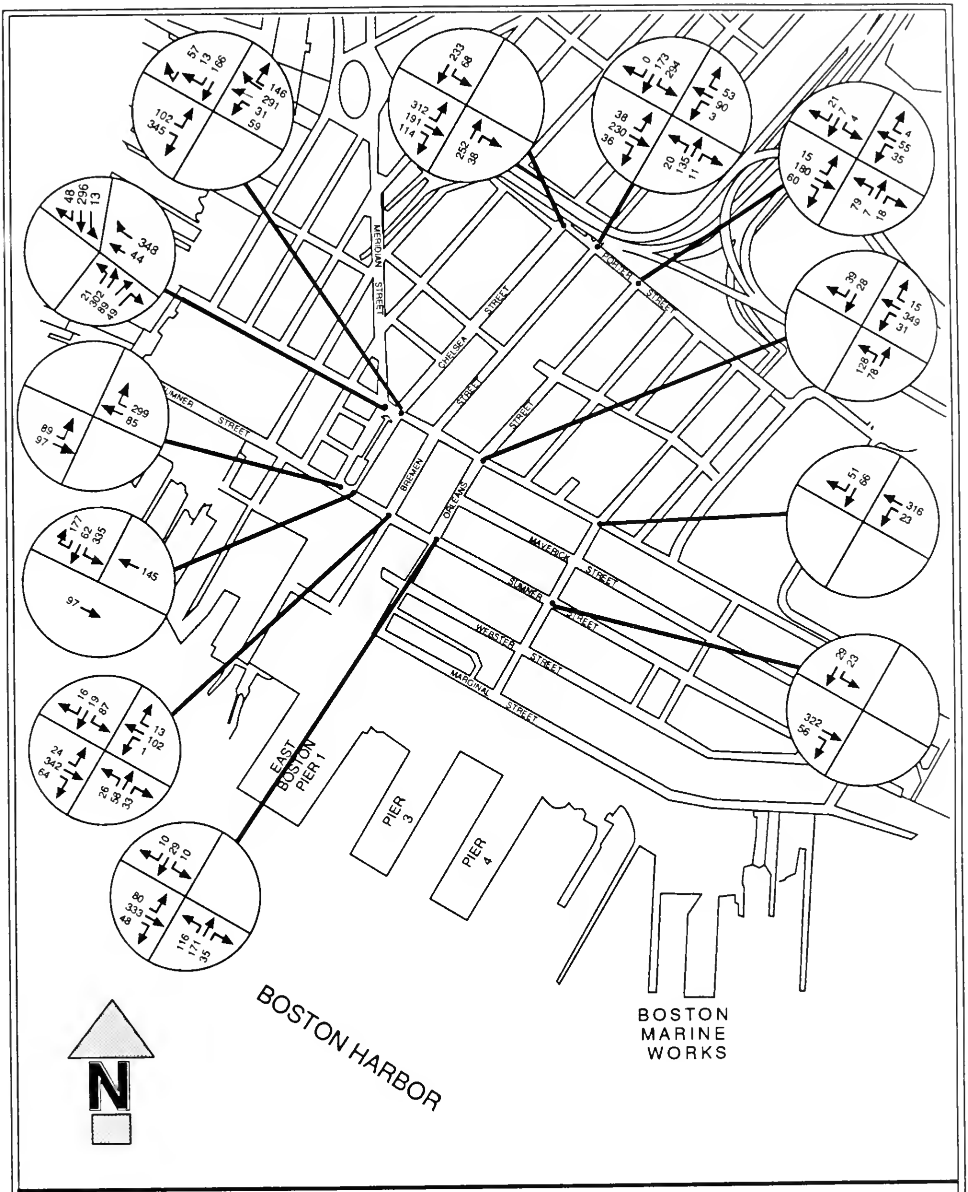

FIGURE 6.4-12
PHASE 1-BUILD ALTERNATIVE: PM PEAK HOUR

TABLE 6.4-8

1990 BUILD ALTERNATIVE - PHASE 1 - PEAK HOUR INTERSECTION OPERATIONS SUMMARY

SIGNALIZED INTERSECTIONS

			No-Build				Build Phase 1			
			AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
	Intersection	Movement	LOS	Average Delay	LOS	Average Delay	LOS	Average Delay	LOS	Average Delay
1)	Chelsea Street @ Porter Street	EB	B	10.9	C	19.0	B	11.6	C	19.8
		NB	B	13.7	B	14.9	B	13.8	C	15.1
		SB	B	13.1	C	16.2	B	13.1	C	16.6
		OVERALL	B	12.0	C	17.3	B	12.4	C	17.8
2)	Porter Street @ Orleans Street	EB	B	5.3	B	5.7	B	5.6	B	5.9
		WB	A	5.0	B	5.1	A	5.0	B	5.1
		NB	B	10.7	B	10.8	B	10.7	B	10.8
		SB	B	10.0	B	9.9	B	10.0	B	9.9
		OVERALL	B	6.8	B	7.0	B	6.9	B	7.1
3A)	Sumner Street @ Maverick Square (Meridian Street)	EB	B	14.6	B	14.0	B	14.7	B	14.0
		WB	C	17.2	C	16.1	C	17.4	C	17.0
		NB	-	-	-	-	-	-	-	-
		SB	B	8.0	B	8.0	B	8.0	B	8.0
		OVERALL	C	16.1	C	15.2	C	16.2	C	15.8
3B)	Sumner Street @ Maverick Square (Chelsea Street)	EB	B	12.0	B	12.0	B	12.0	B	12.0
		WB	B	12.1	B	11.8	B	12.1	B	12.0
		NB	-	-	-	-	-	-	-	-
		SB	B	11.2	B	12.1	B	11.7	B	12.3
		OVERALL	B	11.5	B	12.0	B	11.8	B	12.2

TABLE 6.4-8

1990 BUILD ALTERNATIVE - PHASE 1 - PEAK HOUR INTERSECTION OPERATIONS SUMMARY (Continued)

UNSIGNALIZED INTERSECTIONS

	Intersection	Movement	No-Build AM Peak Hour LOS	No-Build AM Peak Hour Reserve Capacity	No-Build PM Peak Hour LOS	No-Build PM Peak Hour Reserve Capacity	Build Phase 1 AM Peak Hour LOS	Build Phase 1 AM Peak Hour Reserve Capacity	Build Phase 1 PM Peak Hour LOS	Build Phase 1 PM Peak Hour Reserve Capacity
4)	Bremen Street @ Porter Street	EB L	A	1,046	A	1,000	A	1,046	A	1,000
		WB L	A	1,023	A	921	A	990	A	912
		NB	A	638	B	395	A	611	B	377
		SB	A	410	C	246	B	379	C	229
5A)	Maverick Street @ Maverick Square (Meridian Street)	NB	A	454	A	407	A	447	B	364
		SB	D	119	E	49	E	82	E	15
5B)	Maverick Street @ Maverick Square (Chelsea Street)	EB L	A	802	A	699	A	794	A	658
		WB L	A	873	A	789	A	873	A	789
		SB	B	323	D	146	C	289	D	121
6)	Maverick Street @ Orleans Street	WB L	A	1,164	A	1,157	A	1,164	A	1,157
		NB	A	476	A	411	A	441	A	325
		SB	A	638	A	622	A	599	A	611
7)	Maverick Street @ Cottage Street		-- NOT IMPACTED --							
8)	Sumner Street @ Bremen Street	EB L	A	1,036	A	1,062	A	1,033	A	1,045
		WB L	A	879	A	795	A	832	A	787
		NB	A	455	A	449	A	415	A	432
		SB	A	451	B	317	B	394	C	299
9)	Sumner Street @ Orleans Street	EB L	A	1,145	A	1,107	A	1,145	A	1,107
		NB	A	533	B	368	A	471	B	279
		SB	A	605	A	577	A	565	A	528
10)	Sumner Street @ Cottage Street		-- NOT IMPACTED --							

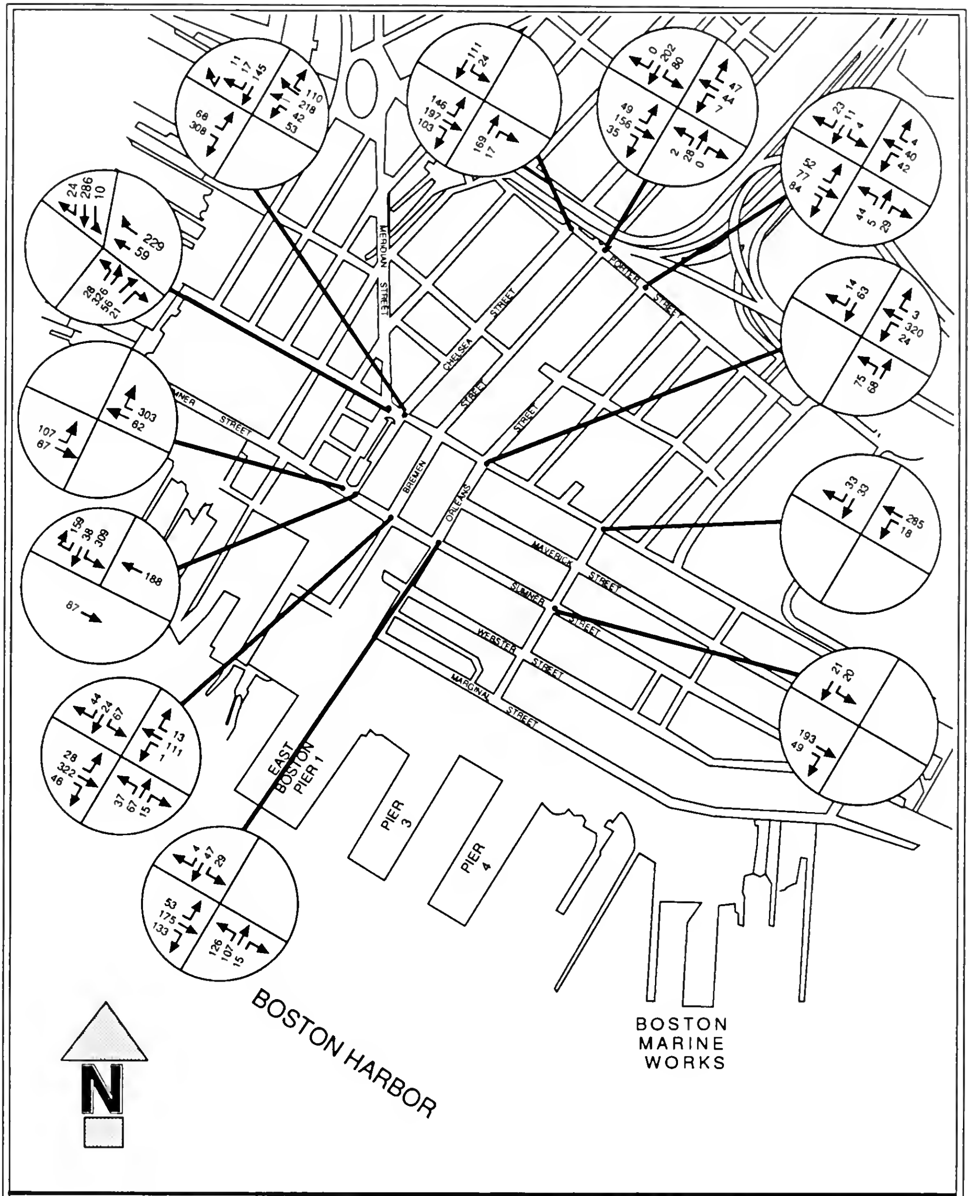

FIGURE 6.4-13
1990 PHASES 1&2 BUILD ALTERNATIVE: AM PEAK HOUR

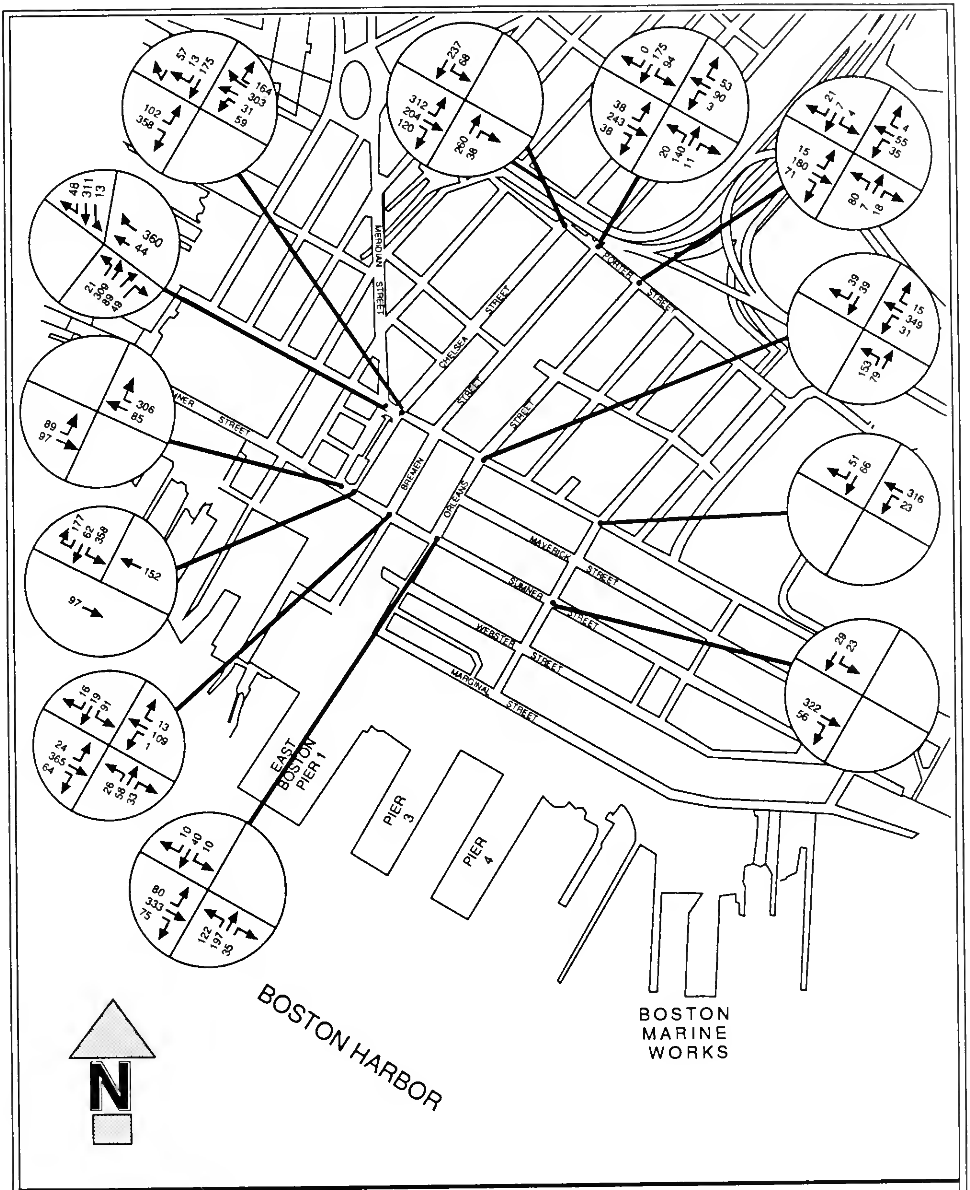

FIGURE 6.4-14
1990 PHASES 1&2 BUILD ALTERNATIVE: PM PEAK HOUR

TABLE 6.4-9
1990 BUILD ALTERNATIVE - PHASES 1 AND 2 -
PEAK HOUR INTERSECTION OPERATIONS SUMMARY
AM PEAK HOUR

Signalized Intersections

	Intersection	Movement	No-Build LOS	No-Build Average Delay	Build Phase 1 LOS	Build Phase 1 Average Delay	Build Phase 2 LOS	Build Phase 2 Average Delay
1)	Chelsea Street	EB	B	10.9	B	11.6	B	11.8
	@ Porter Street	NB	B	13.7	B	13.8	B	13.8
		SB	B	13.1	B	13.1	B	13.1
		OVERALL	B	12.0	B	12.4	B	12.5
2)	Porter Street	EB	B	5.3	B	5.6	B	5.6
	@ Orleans Street	WB	A	5.0	A	5.0	A	5.0
		NB	B	10.7	B	10.7	B	10.7
		SB	B	10.0	B	10.0	B	10.0
		OVERALL	B	6.8	B	6.9	B	6.9
3A)	Sumner Street	EB	B	14.6	B	14.7	B	14.7
	@ Maverick Square	WB	C	17.2	C	17.4	C	17.5
		NB	-	-	-	-	-	-
		SB	B	8.0	B	8.0	B	8.0
		OVERALL	B	16.1	B	16.2	B	16.3
3B)	Sumner Street	EB	B	12.0	B	12.0	B	12.0
	@ Maverick Square	WB	B	12.1	B	12.1	B	12.1
	(Chelsea Street)	NB	-	-	-	-	-	-
		SB	B	11.2	B	11.7	B	11.8
		OVERALL	B	11.5	B	11.8	B	11.9

TABLE 6.4-9

1990 BUILD ALTERNATIVE - PHASES 1 AND 2 -

PEAK HOUR INTERSECTION OPERATIONS SUMMARY

AM PEAK HOUR (Continued)

Unsignalized Intersections

	Intersection	Movement	No-Build LOS	No-Build Reserve Capacity	Build Phase 1 LOS	Build Phase 1 Reserve Capacity	Build Phase 2 LOS	Build Phase 2 Reserve Capacity
4)	Bremen Street @ Porter Street	EB L	A	1,046	A	1,046	A	1,046
		WB L	A	1,023	A	990	A	982
		NB	A	638	A	611	A	605
		SB	A	410	B	379	B	371
5A)	Maverick Street @ Maverick Square (Meridian Street)	NB	A	454	A	447	A	442
		SB	D	119	E	82	E	70
5B)	Maverick Street @ Maverick Square (Chelsea Street)	EB L	A	802	A	794	A	752
		WB L	A	873	A	873	A	873
		SB	B	323	C	289	C	253
6)	Maverick Street @ Orleans Street	WB L	A	1,164	A	1,164	A	1,164
		NB	A	476	A	441	A	423
		SB	A	638	A	599	A	590
7)	Maverick Street @ Cottage Street	-- NOT IMPACTED --						
8)	Sumner Street @ Bremen St.	EB L	A	1,036	A	1,033	A	1,031
		WB L	A	879	A	832	A	820
		NB	A	455	A	415	A	403
		SB	A	451	B	394	B	377
9)	Sumner Street @ Orleans Street	EB L	A	1,145	A	1,145	A	1,134
		NB	A	533	A	471	A	442
		SB	A	605	A	565	A	546
10)	Sumner Street @ Cottage Street	-- NOT IMPACTED --						

TABLE 6.4-9

1990 BUILD ALTERNATIVE - PHASES 1 AND 2 -

PEAK HOUR INTERSECTION OPERATIONS SUMMARY

PM PEAK HOUR (Continued)

Signalized Intersections

	Intersection	Movement	No-Build		Build Phase 1		Build Phase 2	
			LOS	Average Delay	LOS	Average Delay	LOS	Average Delay
1)	Chelsea Street	EB	C	19.0	C	19.8	C	22.8
	@ Porter Street	NB	B	14.9	C	15.1	C	15.3
		SB	C	16.2	C	16.6	C	16.7
		OVERALL	C	17.3	C	17.8	C	19.4
2)	Porter Street	EB	B	5.7	B	5.9	B	5.9
	@ Orleans Street	WB	B	5.1	B	5.1	B	5.1
		NB	B	10.8	B	10.8	B	10.8
		SB	B	9.9	B	9.9	B	9.9
		OVERALL	B	7.0	B	7.1	B	7.1
3A)	Sumner Street	EB	B	14.0	B	14.0	B	14.2
	@ Maverick Square	WB	C	16.1	C	17.0	C	17.5
		NB	-	-	-	-	-	-
		SB	B	8.0	B	8.0	B	8.0
		OVERALL	C	15.2	C	15.8	C	16.2
3B)	Sumner Street	EB	B	12.0	B	12.0	B	12.0
	@ Maverick Square	WB	B	11.8	B	12.0	B	12.0
	(Chelsea Street)	NB	-	-	-	-	-	-
		SB	B	12.1	B	12.3	B	12.7
		OVERALL	B	12.0	B	12.2	B	12.4

TABLE 6.4-9

1990 BUILD ALTERNATIVE - PHASES 1 AND 2 -

PEAK HOUR INTERSECTION OPERATIONS SUMMARY

PM PEAK HOUR (Continued)

Unsignalized Intersections

	Intersection	Movement	No-Build LOS	No-Build Reserve Capacity	Build Phase 1 LOS	Build Phase 1 Reserve Capacity	Build Phase 2 LOS	Build Phase 2 Reserve Capacity
4)	Bremen Street @ Porter Street	EB L	A	1,000	A	1,000	A	1,000
		WB L	A	921	A	912	A	897
		NB	B	395	B	377	B	362
		SB	C	246	C	229	C	214
5A)	Maverick Street @ Maverick Square (Meridian Street)	NB	A	407	B	364	A	346
		SB	E	49	E	15	F	-13
5B)	Maverick Street @ Maverick Square (Chelsea Street)	EB L	A	699	A	658	A	617
		WB L	A	789	A	789	A	789
		SB	D	146	D	121	E	88
6)	Maverick Street @ Orleans Street	WB L	A	1,157	A	1,157	A	1,157
		NB	A	411	A	325	A	284
		SB	A	622	A	611	C	590
7)	Maverick Street @ Cottage Street	-- NOT IMPACTED --						
8)	Sumner Street @ Bremen St.	EB L	A	1,062	A	1,045	A	1,037
		WB L	A	795	A	787	A	767
		NB	A	449	A	432	A	411
		SB	B	317	C	299	C	274
9)	Sumner Street @ Orleans Street	EB L	A	1,107	A	1,107	A	1,107
		NB	B	368	C	279	C	229
		SB	A	577	A	528	A	492
10)	Sumner Street @ Cottage Street	-- NOT IMPACTED --						

Development of the entire project (Phases 1 & 2) will only result in significant impacts at the unsignalized intersection of Maverick and Maverick Square. All other intersections studied will remain at Level of Service C or better, with full development of the project. Overall AM peak operations at the Maverick Street/Maverick Square intersection degrade from LOS D in the No-Build condition, to LOS E (capacity) for the 1990 condition with Phases 1 & 2 of the project. During the PM peak hour, operations are projected to be at LOS E for the 1990 No-Build alternative and the 1990 Phase I project development alternative, but degrade to LOS F (forced flow conditions) for full development (Phases 1 and 2) of the project. As previously indicated, however, signalization at this location has been recommended to address impacts associated with the Clippership Wharf Project and existing baseline traffic. According to discussions with the City's Transportation Department there has not yet been any formal agreement or commitment to complete this improvement project, but it will be discussed as part of the Clippership Wharf access plan process.

6.4.5 Parking

Project Parking Demand

Parking demand for the Boston Marine Works project has been assessed using parking generation statistics developed by the Institute of Transportation Engineers*. Similar to the ITE trip generation statistics, ITE parking generation characteristics are based upon a variety of nationally surveyed developments located mostly in suburban areas. Therefore, the same adjustment factors used in the trip generation analysis** have also been used to determine the peak parking demands of the project.

In a mixed-use development, such as that proposed for the Boston Marine Works project, the peak parking demand for individual development components tend to occur at different times. For example, peak parking demands of office, light industrial/warehouse and heavy industrial/storage uses occur mid-day (between 12:00 noon - 2:00 PM) during the week, with a much lower peak parking demand on the weekend (approximately 1/6 of weekday demand). Parking demand for food service use is expected to peak at about the same magnitude during mid-day periods on both weekdays and weekends. Restaurant parking demand tends to peak

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* Parking Generation (Interim Report), Institute of Transportation Engineers, 1985.

** To appropriately take into account site-specific employment densities, modal splits and vehicle occupancies for each of the individual land uses.

during the evenings (after 5:00 PM) on both weekdays and weekends. The mid-day peak for restaurant parking demand is normally about 1/2 that of the evening peak. A mid-day peak is expected for marine retail parking on both weekdays and weekends, with a higher demand on weekends. Marina parking demand is heaviest during the weekends, but also may be heavy during early evenings on weekdays (after 4:00 PM). Parking demand for restaurant, marine retail and marina uses is significantly greater during the summer months of June and July. Demand for parking from office, light industrial/warehouse, heavy industrial/storage, and food service uses, while not significantly different during these months, it is somewhat lower due to employee vacations.

Although weekday parking demand for restaurants and marina uses tend to be higher during the evening, demand for parking from other project components during this time period is substantially less. During the weekday peak parking demand is therefore assumed to occur at midday. For analysis purposes, the peak parking demand is assumed to coincide on weekends during midday, although not all uses peak during this time period. Peak parking generation rates used for the Boston Marine Works project are summarized for mid-day periods on both weekdays and weekends in Table 6.4-10. A summary of peak parking demand by development component is provided for both the peak weekday and peak weekend periods in Tables 6.4-11 and 6.4-12, respectively.

Parking Operations

The 1990 parking operations analysis identifies the relationship of project parking demand to the availability of on-site parking, for both weekday and weekend peak parking periods. In addition, the location and functioning of on-site parking facilities have been assessed.

1990 Phase 1 Development

The Phase 1 parking demand analysis indicates a peak demand of 177 and 33 parking spaces required during the peak weekday and peak weekend periods, respectively. The parking layout plan in Figure 6.4-15 indicates the location of parking spaces, supplied for the development. It is anticipated that the parking facilities required for both Phase 1 and Phase 2 will be constructed during Phase 1 of the project, with a total of 314 spaces to be provided.

TABLE 6.4-10

BOSTON MARINE WORKS PARKING GENERATION RATES

	Office (1000 sf)	Light Industrial (1000 sf)	Heavy Industrial (1000 sf)	Food Service (1000 sf)	Restaurant (seat)	Marine Retail (1000 sf)	Marina (berth)
Weekday Peak	1.64	1.45	0.32	0.94	0.24	1.00	0.14
Saturday Peak	0.27	0.24	0.05	0.94	0.74	1.30	0.70

TABLE 6.4-11

BOSTON MARINE WORKS WEEKDAY PARKING REQUIREMENTS SUMMARY

	Office	Light Industrial	Heavy Industrial	Food Service	Restaurant	Marine Retail	Marina	Total
Phase 1	58	80	35	4	0	0	0	177
Phase 2	0	0	0	0	24	11	29	64
TOTAL	58	80	35	4	24	11	29	241

TABLE 6.4-12

BOSTON MARINE WORKS WEEKEND PARKING REQUIREMENTS SUMMARY

	Office	Light Industrial	Heavy Industrial	Food Service	Restaurant	Marine Retail	Marina	Total
Phase 1	10	13	6	4	0	0	0	33
Phase 2	0	0	0	0	74	14	146	234
TOTAL	10	13	6	4	74	14	146	267

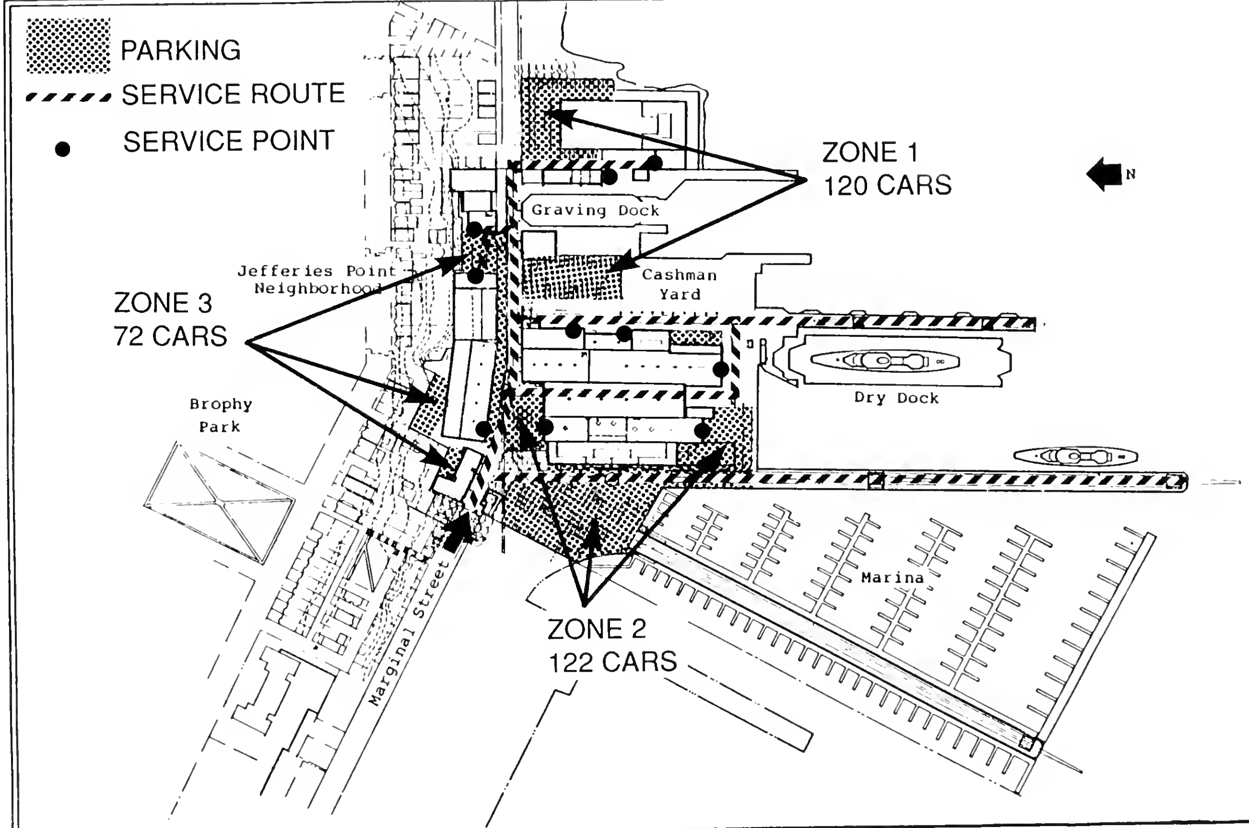

FIGURE 6.4-15 CIRCULATION, SERVICE & PARKING AT THE BOSTON MARINE WORKS

1990 Phase 2 Development (Including Phase I)

A total of 241 and 267 parking spaces will be required during the peak weekday and peak weekend periods, respectively, with completion of Phase 1 and Phase 2 development. The location and number of spaces to be supplied as part of the project totals 314 spaces which will exceed the projected demands. The excess supply will insure adequate capacity during unusual peaking periods, so as not to impact off-site traffic operations.

6.4.6 Truck Traffic

Truck Generation and Circulation

Traffic associated with truck trips to/from the project site was included in the trip generation estimates presented in the Draft EIR. These trip generation estimates represent total trips to/from the site, including automobiles, trucks and taxis for all trip purposes. A separate, detailed truck analysis was not presented in the Draft EIR since it was not mentioned in the MEPA Scoping Certificate. In order to appropriately address comments that were raised on this issue, however, an analysis of truck generation and circulation, truck parking, fuel trucks and off-street loading requirements has been performed. The following presents the results of this analysis.

Truck trip generation rates presented in the ITE Transportation and Traffic Engineering Handbook* were used to estimate the number of truck trips to/from the project site, by land use. These are presented below:

Use	Rate (Per 1,000 SF)*	Total Truck Trips Daily*
Office	0.20	7
Light Industrial	0.50	28
Heavy industrial	0.50	56
Food Service	0.30	1
Marine-Related	0.30	3
Restaurant	3.60	18
Marina	**	**
TOTAL TRUCK TRIPS (ONE-WAY)		113

* Transportation and Traffic Engineering Handbook, Institute of Transportation Engineers, Second Edition, 1982.

** Negligible.

The estimated number of truck trips represent approximately 13 percent of the total daily traffic generated to and from the project site. A representative distribution of this truck traffic throughout the course of a typical weekday is illustrated in Figure 6.4-16. This figure demonstrates that the majority of truck traffic will occur during off-peak periods.

The vast majority of truck traffic destined to the site will be coming from the major highways providing access to East Boston, namely:

- Route 1A from the northeast;
- Meridian Street from the north; and
- The Sumner/Callahan Tunnels from points northwest, west and south.

Most of these trucks would use Meridian Street and Chelsea Street, to Sumner Street, to Orleans Street, to Marginal Street to gain access to the site. There is not expected to be any project-related truck traffic activity west of Orleans Street, in the Jeffries Point area.

Most of the trucks serving the project are expected to be single unit trucks with a total length of 30 feet or less. A small number of semi-trailers with a total length up to 55 feet, would, however, occasionally be required to service the light and heavy industrial uses.

Truck Parking

Trucks associated with the Boston Marine Works Project will be concentrated in one location. It must be noted that very few trucks will ever be located on the site at one time due to the fact that most of the vehicles move from one off-site job to the next.

Truck Fuel Issue

The Boston Marine Works will not keep fuel trucks on the site on a permanent basis. They are brought in as needed, (e.g., when tanks and equipment such as cranes need fueling). When cranes are fueled, they are brought all the way inboard, off the pier areas.

Many of the existing tugs and commercial vessels are fueled off site.

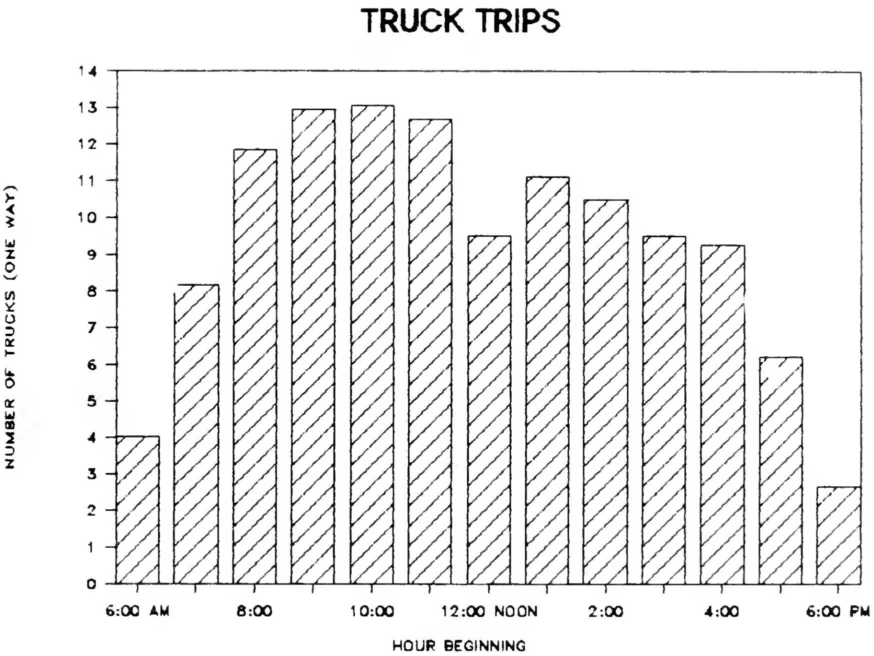

FIGURE 6.4-16 DISTRIBUTION OF PROJECT TRUCK TRIPS

HMM ASSOCIATES, INC.

Off Street Loading Requirements

The internal site circulation plan for the proposed project has been designed to adequately accommodate truck circulation and loading requirements. All loading/unloading activities will be performed on-site, with no impact to public circulation or traffic flow. There is adequate storage on-site to accommodate multiple truck arrivals, such that queuing will not cause off-site blockages of traffic.

The site has been designed to accommodate the widths, lengths and turning radii of vehicles as large as tractor trailer trucks. Figure 6-4.15 shows the various locations of truck loading areas.

6.4.7 Pedestrian Circulation

Pedestrian circulation has been an important aspect of overall project planning. Figure 6.5-1 in Section 6.5 illustrates the major pedestrian corridors on-site, between the various parking areas and the individual uses. The primary external pedestrian corridors will be along Marginal Street and the Golden Stairs toward Webster Street.

6.4.8 Traffic Impact Summary

The planned mixed use development of the Boston Marine Works site, with emphasis on marine-oriented activities, is a project whose scale will allow suitable access without undue negative impact on the total transportation system. As has been presented, and will be discussed briefly below, the vehicular trip generation of the development is not great enough to mandate any radical change in the surrounding street network.

It has been assumed that any development proposals for the Massport Piers project, other than the level of development which was previously filed with MEPA, must take the proposed project access demands into account along with its own traffic generation (and any other so related) to determine future impacts and transportation needs.

(1) Vehicular Trip Generation

Vehicular trip generation estimates for the total of Phases 1 and 2 indicate daily arrivals of up to about 870 cars, with the total peak hour volumes amounting to about 170 cars. In practice, traffic originating from a site disperses quickly through the roadway network so that its operational impact is greatest closer to the site and is gradually less significant the further one is from the site.

(2) Roadway Levels of Service (LOS)

The project proponent is committed to making serious efforts to minimize the amount of automotive traffic serving the site through a number of management measures to encourage the prevalence of walking, use of public forms of transportation, and car pooling. This is desirable both in a general sense to reduce automobile traffic in the area, apart from the technical capacity of the roadway system, and to help solve operational problems at specific locations that are identified. Problem locations could also be directly improved through physical roadway widenings or other geometric changes or through traffic control measures involving circulation, signs, signals, markings and regulations.

Within the study area, only one intersection will operate at less than an acceptable Level of Service with full development (Phases 1 & 2) of the project. This is the intersection of Maverick Street and Chelsea Street with Maverick Square (in both the AM (LOS E) and PM (LOS F) periods). Overall traffic reduction measures could bring much more satisfactory conditions at this location, but operational improvements of a physical or traffic control nature will also be required. The project proponent will commit to a share of the cost of traffic signalization at this intersection. The contribution should be proportionate to the relative volume of project traffic versus total traffic travelling through this location.

A number of alternative roadway access options to the East Boston Piers area have been evaluated in the past.* These have included use of the abandoned Conrail rail line for a new roadway, the extension of Marginal Street between Bremen Street and Orleans Street, and the development of one-way pair street systems along Bremen Street and Orleans Street. The magnitude of project-related traffic and associated impacts does not warrant a detailed evaluation of these major improvement alternatives. It should be noted, however, that the above alternatives are scheduled to be evaluated as part of the on-going Massport Phase 1 Lobster Pier project analysis.

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* See, for example: "Traffic Analysis - East Boston Harborside Project," Prepared by R. S. Niedowski for MASSPORT, March 30, 1984.

(3) Other Modes of Transportation

The project site is relatively well-served by public transportation through the Blue Line at Maverick Square, accessible via a rather long direct walk or by MBTA bus route 120. More specific to the site with its waterfront location and marine use orientation is the potential for water transportation. Access to and from Downtown Boston core area locations would provide the greatest potential.

Transit Incentives - Emphasis on employment of East Boston residents would increase the prevalence of walking to work. Exploitation of "other" modes of travel can go far in reducing automotive access demands. In order to minimize impacts associated with the project and encourage increased transit usage, the project proponent will commit to a formal MBTA employee subsidy program. The proponent will offer a subsidy of up to 50 percent on the purchase of MBTA passes for his employees for transportation to/from the site.

Transit access to the Blue Line at Maverick Square will also be enhanced by the provision of a shuttle service when activities on the site grow to the point when the number of people warrant such service. For those willing to walk from transit, future plans in the general area, buttressed by Chapter 91 and Harborpark policies, will create better pedestrian ways. The project proponent will also work with the MBTA to arrange the extension of "T" bus service from Maverick Station to the Boston Marine Works.

Pedestrian Access

The proponent has met with Gary Brown, an abutter of the "Golden Stairs" and terrace area who is one of the neighborhood's most concerned citizens regarding the maintenance and renovations of this open space/community access area. Apparently the priority concerns for this area are: repairing 2 inoperative light fixtures along the stairs; installation of fencing along Brigham Street in the area of the retaining wall for safety concerns; replacement of decayed railroad ties on the north side of terrace area; and improving conditions of grass in the terrace area through loaming and seeding or sod.

The proponent understands that the Boston Conservation Commission is the City agency which owns the terrace/Golden Stair area. Unfortunately the Commission does not have funds for the maintenance of parks, and generally, maintenance has been performed by local citizens who also have limited resources. The proponent is committed to working with the City and local citizens in maintaining and upgrading this area. To this end, when the landscaping/site work is done at the Boston Marine Works facility during the spring and summer of 1988, the proponent will either have his contractor also address the priority concerns at the "Golden Stairs" or allocate funds to have the work done through the local citizens.

Provision of Water Transport - More specific to the site with its waterfront location and marine orientation is the potential for water transportation, either through incorporation of existing service or by creation of service specific to site activities. The project proponent is committed to promote water transportation to the greatest extent possible as a means to reduce automotive access to the site. There are two ways in which this might be done: by incorporating the site as an additional stop for existing water transportation routes, or by the establishment of new service sponsored by the project proponent. Obviously, the former requires agreement with others, while the latter may be unilaterally introduced, assuming landing opportunities at remote pickup/drop-off points.

The MEPA DEIR Certificate questioned the feasibility and impact of a diversion of an existing service, in particular asking about a detouring of the Logan Airport water shuttle. This has been investigated through communication with the manager of the existing service.

The Airport water shuttle offers 15-minute headways on weekdays from 6 AM to 8 PM, and 30-minute headway on weekends from noon to 8 PM. Patronage has now grown to 530 passengers per day (7-day week). Further growth potential is considered good, as the service is fast, reliable, and receives good promotion and incentives. If the shuttle were diverted to stop at the Boston Marine Works also, the weekday running time would be delayed by at least 8 minutes. This would more than double service times. The judgment was made

that such a diversion would seriously degrade what is now a premium service, and severely damage patronage and growth prospects. The inclusion of the site as part of the Airport shuttle is thus not considered feasible.

The above applies to the diversion of at least some of the other water transportation services in Boston Harbor. The proponent therefore recognizes that a commitment to his own provision of water service is necessary, while still recognizing the possibility of sharing services with other developments, should the opportunity arise in the future. The project proponent will therefore establish a shuttle service of its own for employees or visitors, provided with 2-way radio-telephone to give Boston and the regular commuter boat schedules. This will also be promoted for use by people coming to the on-site restaurant. This commitment will be triggered when the total on-site employment levels reaches a total of 150 employees.

With respect to the marina operation, the above boat will also serve, outside of, or in conjunction with commuter conveyance, boaters wishing to access the marina from Downtown. It has to be pointed out, however, that many marinas have launches or utility boats as a normal matter. These can be put in oncall service for boaters during the boating season, and even double for commuter service during these months. The Boston Marine Works will make such launch service mandatory in the lease of the facilities when the marina is established.

Water transportation will not be practical nor desired by all of the people traveling to the Boston Marine Works. The provision of clean, convenient and reliable service has proven its attractiveness in the Airport shuttle, and should prove to be successful here. Although it is extremely difficult to estimate the latent demand for such a service, it is assumed that such a service may attract upwards of 5% of workers, boaters and visitors to the site.

Carpooling - Carpooling and vanpooling will be encouraged by preferential assignment of parking spaces, matching efforts, and by other promotional means such as brochures and employee awards. Assistance in this as well as transit promotion will be sought from the non-profit Caravan Inc.

(4) Parking

The provision of 314 parking spaces on-site will satisfy the projected parking demand associated with project activities. It is important to note that the peak parking demands of some different activities (e.g. marina and marine industrial) do not occur at the same time, allowing shared use. The project site will adequately service the anticipated demand for parking, as both for automobiles and trucks, with full development (Phases 1 and 2) of the project.

6.5 Public Access and Open Space

As BSC Shipyard facilities, the site provided no opportunities for public access. At the time Massport acquired the facilities the project site was closed and in a dilapidated condition.

The proposed Boston Marine Works project will greatly improve site conditions by making substantial, costly improvements to the waterfront facilities, so that new public open spaces can be created within the marine-dependent Zone 2 - Marine Services Area. The proponent will accommodate and encourage public access to the Marine Services portion of the site through proper design and signage. While the Zone 1 portion of the site will be restricted because of operational safety, insurance, and liability constraints, the project design does provide view access to parts of this use area.

As shown on Figure 6.5-1, the primary access point for the public to the Boston Marine Works will be through the main gate, and past the information/security Gate House building. The public will be allowed to utilize the viewing platform on the roof level of this building to view the waterfront facilities, the marine services area and the distant Boston skyline.

Public pedestrian access will be encouraged within the Zone 2 - Marine Services Area at the marine retail store and the restaurant and public restrooms will be provided. A waterfront walkway that extends out onto Pier 1 will be created for passive recreation such as walking.

At the present time, portions of the marine services area on the project site are in a dilapidated condition and cannot be uitlized as a public open space without substantial improvements. For example, Pier 1, built circa 1943 and its deck system which was renewed in the 1950's needs to be rebuilt. Since its original construction, the pier has been equipped with a revolving gantry crane and numerous electrical and utility systems. It has been used almost exclusively for ship repair and outfitting purposes. However, this pier is currently in poor overall condition. The exposed top surface is worn and weathered. At some locations the deck planks are in advanced stages of decay. Numerous holes due to localized failure are covered over with steel sheet or plywood. Timber stringers are severely deteriorated due to rot. Also, the timber deck area that leads onto Pier 1 at its northwest corner shore connection is also in generally poor condition. Many supporting piles are exhibiting severe deterioration at the top butt ends.

These areas will be improved by replacing selected piles, stringers, complete redecking, and the provision of lighting and benches, to permit the public's access to the waterfront edge. Public access will also be provided from the waterside of the project. The boating public will be able to utilize the site for transient accommodations, fuel, sewage pumpout and supplies within the marine services area. To further accommodate the boating public, a dingy dock and a water-taxi/launch loading area will be provided at Pier 1 on the western side.

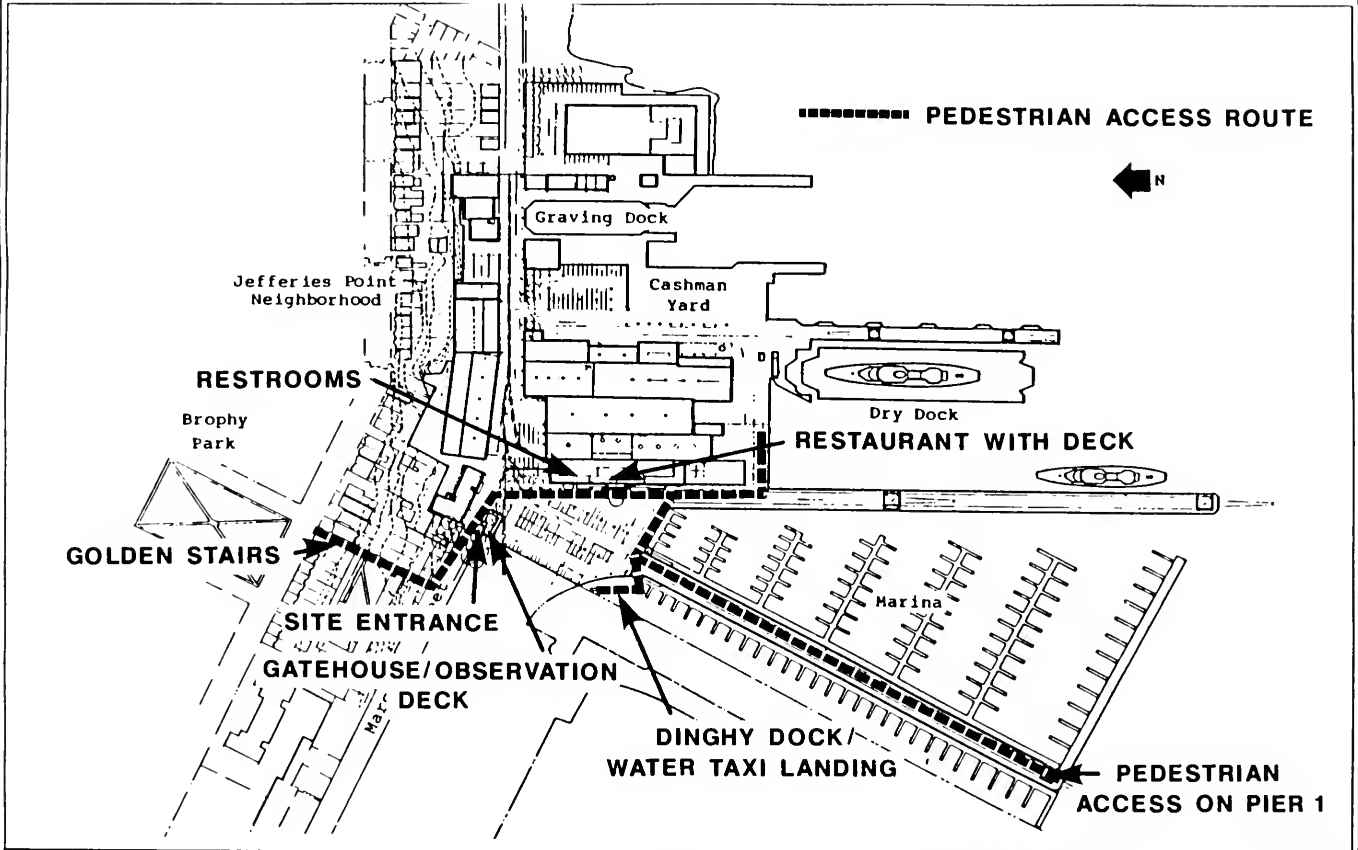

FIGURE 6.5-1 AREAS OF PUBLIC ACCESS AND OPEN SPACE AT THE BOSTON MARINE WORKS

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Finally, the "Golden Stairs" have provided pedestrian access from the Jefferies Point neighborhood on the hill overlooking the harbor to Marginal Street for over 50 years. But this area has been in need of repairs and maintenance for some time and use has declined. To encourage greater public access to the East Boston waterfront the proponent has committed to working with the City and local citizens to upgrade and maintain the fencing, lighting and landscaping in this area. This will provide a useable link between Brophey Park and Webster Street and the proponents public access/open space areas to be created at the Boston Marine Works.

SECTION 7

7.0 MITIGATION MEASURES

7.1 Enhancements Specific to the Nature of the Project

MEPA regulations require that Environmental Impact Reports address mitigation measures intended to limit the negative effects of constructing and operating new projects. The requirement infers that new projects may entail disruptive construction practices and new operations-related impacts. The Boston Marine Works proposal, however, is not a new construction project that fits this mold. Instead, it is a renovation project that entails potential for much more enhancement than impact. The project will refurbish approximately 220,000 sf of building area. The project will also renovate and repair the five piers and the bulkheads along the waterfront. By-products of this renovation will include the following.

Restoration of Marine Industrial Activity

Ship repair activities have already been restarted. This preserves one of the most viable ship repair facilities in Boston. The ship repair activity is needed by the commercial vessel operators in the harbor and is also a valuable source of employment opportunities for East Boston.

Restoration of the Waterfront

The waterfront facilities at the Boston Marine Works site are in dilapidated condition. Restoration of the five piers and bulkheads will prevent the acceleration of the deterioration that has taken place over the past twenty years. The marine environment at the harborfront will be directly enhanced, the opportunities for deteriorating structures to become hazards to navigation will be eliminated.

Portions of the Site Will be Reclaimed for Public Use

Restorations include designs for providing public access that has not previously existed on the site. Public access will take the form of improved public walkways. These walkways will include the Gate House and its observation deck; an improved walkway with street furniture on Pier 1; and access to the roof deck restaurant. Likewise, the marina portion of the design will improve public access to Boston Harbor. The marina will provide not only slips for its patrons,

but transient slips, fuel facilities, and dinghy dock access for the boating public. The newly created public access components will be tied directly to the Jeffries Point neighborhood by improvements to the Golden Stairs.

The improvements included in the Boston Marine Works designs will result in increased public activity at the site. The increased activity may entail potential for indirect impacts despite the positive nature of the renovation program. The proponent has prepared plans to mitigate these impacts. The mitigation measures may be divided into the impact categories discussed in the preceding section of the EIR.

7.2 Marine-Related Issues

A series of mitigating measures will be implemented to address marine-related issues. These issues include compliance with Chapter 91 criteria: possible hazards to navigation; structural criteria for the proposed recreational marina; rights of adjacent property owners and the public; possible impacts to resource areas; criteria for projects in Designated Port Areas; Army Corps of Engineers Section 10 permit issues; and the compatibility with the Harborpark program.

Hazards to Navigation

The design for the proposed recreational/commercial marina will meet Chapter 91 - Waterways design standards by:

- Avoiding the construction of structures that extend seaward of the Pier and Bulkhead line;

- Precluding structures that extend into the existing shipping channel or impede free passage;

- Maintaining the line of sight required for navigation;

- Implementing a design free of waterfront uses that require the alteration of an established course in the main ship channel;

- Preserving access to the adjoining East Boston Piers - Pier 5 area;

- Avoiding construction that requires any solid fill structure; and

- Retaining the public right to safely pass upon the tidewaters of the Commonwealth in vessels.

The marina will be in a protected embayment area of private and Commonwealth tidelands, thus affording safe water access to the public. There is more than sufficient deep water area adjacent to the site outside the main shipping channel to provide for safe operation of all vessels. Signs will be posted (i.e., no wake, 5 knots) and safe boating practices will be promoted, alerting boaters to avoid interaction with larger vessels that must utilize the shipping channel 1,200 ft. seaward of the Boston Marine Works.

Any debris that might be created during the rehabilitation of the piers and bulkheads will be carefully retrieved, preventing flotsam from causing a hazard to navigation in the area.

<u>Structural Criteria</u>

A floating breakwater will reduce wave impacts within the protected embayment at Piers 1 and 2 due to wakes and storms. This breakwater will be designed to protect the marine services area from storm waves generated by coastal storms up to the 100-year frequency event, and from winds of up to 100 mph. The proponent proposes to rehabilitate the existing piers and bulkheads as part of their operations. The maintenance of these facilities will be subsidized with income generated from the marine services area. This will help prevent further deterioration of the existing structures.

Marina slips on the southwest side of Pier 1 from the property line will be set back to provide for an access channel to be shared with the adjacent user such that operations will not impair access to East Boston Pier No. 5.

<u>Protection of Resource Areas</u>

The project as proposed will not generate any negative impacts to resource areas due to the limited nature of the proposed work actually on the waterfront and the existing developed nature of the area. Mitigating measures that will be used to minimize impacts to the coastal resources include limiting the amount of bottom disturbance and turbidity during any pile driving. Non-leaching chemical preservatives will be used on all timber construction materials to protect water quality. Implementation of the hazardous waste management plan and site drainage improvements, discussed in subsequent paragraphs, will also serve to minimize impacts to the waterfront.

Designated Port Area

The purpose of CZM's Policy #7 is to encourage marine commerce and development of marine-dependent uses in the Designated Port Areas of urban waterfront locations. The state encourages the use of sites, such as the Boston Marine Works site, for uses dependent upon access to deep water ports. Were it feasible, the reactivation of the site as a large scale shipyard would be consistent with this policy. The current lack of demand for large-scale ship repair services, however, preclude the viability of the exclusive use of the entire site as a shipyard. The proponent, however, is proposing a concept that is consistent with the intent of the policy. The Boston Marine Works concept is a mixed-use development of the site that proposes current uses that respond to existing market demands, but without foreclosing the return to exclusively marine industrial uses at some future time, should that be desirable. The plan entails using nearly two-thirds of the site for marine-dependent industrial uses in Zone 1. These uses are supplemented by the commercial/recreational marine services in Zone 2, and by the office/commercial uses proposed for Zone 3. While not an industrial large ship repair use, the marine services area is obviously marine-dependent. The office/commercial space in Zone 3 is also not marine industrial, but it constitutes a small portion of the site landward of the Designated Port Area and the proponent must use best efforts to attract marine-related users here as well. Also, it is located on the portion of the site that is historic uplands rather than tidelands. Mixed-use development generates the income to repair and maintain the waterfront piers and bulkheads without impeding the special physical and operational needs of this marine-dependent industrial area, or sacrificing its ability to return to industrial uses at some future date.

7.3 Hazardous Materials

Industrial chemicals will be used and stored on the site as part of the ship repair operation. These hazardous substances include oil and gasoline, paints and solvents, and other chemicals associated with a commercial marine repair facility. All of these were present during previous shipyard operations. A summarization of the management plan for the safe control of these substances is included in this Final EIR as Section 6.2 This plan mandates the proper storage of these substances away from the harbor to ensure that no accidental spills occur. Fuels will be stored on-site in three new underground storage tanks which will be tightness tested utilizing the Petro-Tite method.

Fuel oil will be stored and dispensed to commercial vessels and contracting equipment from a tank truck. During off-hours, if the mobile tank truck is stored on-site, it will be located at an area over 100 feet from the shoreline on an impervious surface with adequate emergency containment devices nearby. It is anticipated that flammables will be stored in Building No. 17, an area designated specifically for that purpose. This building will have adequate containment in the event of a spill or leak.

Paints will be used at the floating dry dock and the graving dock. The yard master will inspect the work area to ensure the cleanliness of the docking facility and the proper removal and clean-up of chemicals.

7.4 Sewage Disposal and Stormwater Discharge

Sewage generation will be minimized by installation of new plumbing fixtures, such as limited flow faucets and toilets and low-flow showers. These fixtures will replace existing facilities. Grease traps will be installed and maintained in all kitchen areas.

It should be noted that this project is a rehabilitation and change in facility use that will result in a net decrease in sewer generation (i.e., about 55% of previous shipyard use). Although this in itself represents significant mitigation, the proponent is further proposing to offset the project's impacts on wet weather flows to the combined sewer on Marginal Street. The roof of the Machine Shop, Building Nos. 12 and 32, presently drains to the combined sewer on Marginal Street. Separation of this source of stormwater from the combined sewer will, in effect, offset the sewage flow from the entire project during wet weather. The peak sewage flow from the project is about 0.047 MGD. Building Nos. 12 and 32 have a roof area of about 26,000 sf, so that even with a conservatively low average rainfall intensity of 0.2 in/hr, the peak runoff rate from these buildings would be about 0.074 MGD.* This is more than adequate to offset the impact of the entire project sanitary flow on the combined sewer during wet weather conditions. The clean water from the rooftop drainage will be discharged to Boston Harbor rather than to the combined sewer where it could contribute to combined sewer overflows.

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* By the Rational Method, Q = Cia, where Q = peak runoff rate (cfs), C = runoff coefficient (0.95 for rooftops), i = average rainfall intensity (in/hr), and a = drainage area (acres). (For i = 0.2 in/hr, a = 26,000 SF/(43,500 SF/ac) = 0.60 acres: Q = 0.95 x 0.2 x 0.60 x 0.646 MGD/cfs = 0.074 MGD.

All outdoor paved industrial areas of the site will also be equipped with catch basins and oil/gas separators. Proper spill control and countermeasure procedures will be employed to prevent the introduction of hazardous industrial products and wastes into the drainage system. All catch basins on-site will be cleaned as needed (probably 1-2 times/year) to maintain effective performance. Oil/gas separators will be checked periodically (2 times/year) and skimmed as needed to remove accumulated oil, grease, and gas.

7.5 Transportation Mitigation Measures

The Boston Marine Works project is in an unusual situation with respect to project-related transportation impacts. The demands created by the completed project will be less than those created by the site when it was an active shipyard. Because the site has been dormant for nearly two years, however, the project will be perceived as adding to local traffic demands. Over the next few years, other projects will also be starting. These include the Clippership Wharf project and the improvements to the Massport piers to the west. Simultaneous start-up at these sites could have cumulative effects on the limited roadway system through East Boston and the Jeffries Point neighborhood. With these thoughts in mind, the project proponent is committed to several efforts to minimize the contribution of the Boston Marine Works to local automotive traffic. The transportation mitigation measures to which the proponent is committed are as follows:

- The Maverick Street/Maverick Square intersection is the one location at which Boston Marine Works contributes to unacceptable traffic congestion (LOS E). The project proponent will commit to a share of the cost of traffic signalization at the intersection of Maverick Street at Maverick Square. The contribution should be proportionate to the relative contribution of project traffic versus total traffic travelling through this location.

- The project proponent will commit to an MBTA employee subsidy program. The proponent will offer a subsidy of up to 50 percent on the purchase of monthly MBTA passes for its employees. Tenants of the site will be encouraged to have similar programs.

- The project proponent will also work with the MBTA to arrange the extension of "T" bus service from Maverick Station to the Boston Marine Works project site. Until that service can be arranged, the proponent will provide shuttle service to the Station during AM and PM rush hours when overall site employment exceeds 150.

- The project proponent will commit to seeking promotion of carpool/vanpool efforts for the non-profit Caravan, Inc.

- The project proponent will undertake physical and lighting improvements along the "Golden Stairs" in an attempt to increase the attractiveness of using MBTA bus Route 120. The proponent will also share in the maintenance of this walkway.

- The proponent will provide a terminal for water-taxi service to the site. The site will be provided at either the end or the base of Pier 1. The proponent has already discussed the feasibility of arranging a fixed system with other waterfront property owners. Once a taxi route system is established, the proponent will work with other property owners to select and establish a suitable taxi service vendor.

With these mitigation measures in place, the proponent feels that its neighbors should feel little or no adverse impact from the project. Instead, the project should be perceived as providing significant enhancements to its neighbors and to the City at a minimum cost.

SECTION 8

8.0 RESPONSES TO COMMENTS ON THE DRAFT EIR

Twenty sets of comments were received on the Draft EIR for the East Boston Shipyard now referred to as the Boston Marine Works (EOEA No. 6407). Commenters were:

1.0 The Executive Office of Environmental Affairs
2.0 City of Boston, The Boston Redevelopment Authority
3.0 The Massachusetts Water Resources Authority
4.0 The Massachusetts Port Authority
5.0 The Metropolitan Area Planning Council
6.0 The Boston Shipping Association
7.0 The Massachusetts Office of Coastal Zone Management
8.0 Jefferies Point Harborside Neighborhood Association
9.0 The Harborpark Advisory Committee
10.0 City of Boston Environmental Department
11.0 City of Boston Transportation Department
12.0 The Boston Harbor Associates
13.0 Boston Barge and Tugboat Company, Inc.
14.0 Woods Hole, Martha's Vineyard and Nantucket Steamship Authority
15.0 Eastern Tugboat Corporation
16.0 Fournier Marine Corporation
17.0 Massachusetts Bay Lines
18.0 New England Fisheries Development Foundation, Inc.
19.0 Bay State Towing Service
20.0 Puritan Fish Company

8.1 Responses to Comments on the Draft EIR

Copies of the comment letters requiring a response are included in section 8.1 of this Final EIR. Each letter has been assigned a number, as shown above. In addition, the comments within each letter are identified by subsection numbers, located in the left-hand margin of each page. These subsection numbers are utilized to reference the specific comments in providing responses. All comments on the Draft EIR have been addressed within the text of this Final EIR document in the appropriate section. In order to demonstrate that the proponent has addressed the expressed concerns of the commenting agencies, the location of the response within the document is indicated in the right-hand margin.

The Commonwealth of Massachusetts
Executive Office of Environmental Affairs
100 Cambridge Street
Boston, Massachusetts 02202

MICHAEL S. DUKAKIS
GOVERNOR

JAMES S. HOYTE
SECRETARY

October 2, 1987

1.0

CERTIFICATE OF THE SECRETARY OF ENVIRONMENTAL AFFAIRS ON THE DRAFT ENVIRONMENTAL IMPACT REPORT

PROJECT NAME	: Boston Marine Works
PROJECT LOCATION	: East Boston
EOEA NUMBER	: 6407
PROJECT PROPONENT	: J.M. Cashman Marine
DATE NOTICED IN MONITOR	: August 26, 1987

Comment No. | **See Referenced Section for Response**

The Secretary of Environmental Affairs herein issues a statement that the Draft Environmental Impact Report submitted on the above project adequately and properly complies with the Massachusetts Environmental Policy Act (G.L., c.30, s.61-62H) and with its implementing regulations (301 CMR 11.00).

Overview

Generally, the Draft EIR has taken a "broad brush" approach to the issues. This has been shown to be unsatisfactory by the number of thoughtful comments received. In the main, the report itself has been censored, and not the merits of the project. The Final EIR will, therefore, have to be of highest quality in order to overcome the serious limitations identified in this Certificate and in the public comments.

The sections of the report dealing with maritime interests have overlooked the scope requirement for an assessment of the
1.01 shipyard expansion as an alternative to the program proposed for 4.2
Phase II. The Draft report's arguments that such a plan is infeasible are largely unsubstantiated, and those arguments have been countered in a number of comments received.

1.02 The question whether the site can sustain commercial maritime activity, without the recreational marina component is of major consequence, since the site is in a Designated Port 4.2
1.03 Area. Such a mixed use project is an exception to policy, and therefore should be held up to the highest scrutiny.

The comment received from the Boston Harbor Associates
1.04 regarding the potential for the expansion of the shipyard is 4.2
especially thoughtful, and it should provide some clear guidance
for further analysis in the FEIR.

The Final report will be expected to address the comments dealing with C.91 issues, Harborpark, and Maritime Economy Reserve Zones (MER). Based on the comment from Massport, there could be a misunderstanding with respect to the jurisdiction
covering those topics. Because of the lease of Commonwealth Section 2
1.05 lands, I have unlimited jurisdiction here, over environmental
issues, irrespective of the city and state permit requirements &
for the project. Given that the jurisdiction question has been Append
raised by Massport, it would be useful to include a clarificatio C
of any city and state permit exemptions that might be enjoyed by Massport. Does the lease convey these exemptions to the proponent?

Traffic

The 1990, No Build alternative should have included the
projected traffic from the Lobster Pier and public park project 6.4.2
1.06 (EOEA #5671), as well as the the traffic from Clippership Wharf 6.4.3
(EOEA #5866). Both projects have previously filed with the MEPA Unit, and should have been considered in the analysis.

This is an egregious error, since MEPA policy regarding
previous filings is well known. Furthermore, the scope 6.4.3
1.07 specifically called for the East Boston pier projects to be included in the traffic analysis.

It is not at all clear why the combined Phase I and Phase II
traffic impacts were not evaluated. Nowhere in the report are Table
the traffic impacts of the entire project presented. Tables 6.4-
6 and 6.4-8 show the levels of service (LOS) at key intersections 6.4-
for each phase. These two tables should be combined to show the levels of service in 1990, Full Build.

Even without considering the entire project, the traffic study shows a deterioration in traffic operations at Maverick Square and the intersection of Orleans/Sumner which relates to the project. Maverick Square will operate at LOS E (AM peak) and LOS F (PM peak), and Sumner Street will operate at LOS E in the PM.

General Mitigation Factors

1.08

This section of the report must be completely redone. It's 7.0
apparent that very little thought and attention has been given to

been quantified. Neither has an analysis been provided to show that parking turn over by different user groups will not conflict for the limited on site parking spaces.

According to the DEIR, a shuttle service will be provided to the Blue Line, "(w)hen activities on site grow to the point when
the number of people warrant such service." This open ended 6.4.8(3)
commitment is as good as no commitment at all. What number of
1.14 people would warrant a shuttle? At what point in the project
development can it be predicted that a shuttle would be
necessary? In the absence of the shuttle, shouldn't the walking 7.5
distance (more than 1/2 mile) be considered too lengthy to consider the MBTA Blue Line a viable alternative to automobile use?

1.15 The EIR should have considered other options to enhance mass 6.4.8
transit use, such as employee subsidies as an incentive.

Particular attention should also be given to the Jeffries 7.5
Point comment which has made the observation that the potential 6.4.8
1.16 use of bus transit by the project is hampered somewhat by the
lack of maintenance on the "Golden Stairs" which lead from the 6.5
Golden Stairs Park to Marginal Street.

1.17 Plans showing the onsite parking, and automobile and truck 6.4.5
circulation, offloading, and service areas should have been
1.18 presented. Previous users accomodated parking overflows on site. 6.4.5
How will this be accomplished, or will excess parking compete with other uses on neighboring streets? The FEIR should provide
1.19 a more complete assessment of the parking situation, including a 6.4.5
discussion of weekday and weekend, short and long term parking rotations, which were identified in the report.

C.91, Tidelands

The report's presentation of documentation and discussion of the historic high water line is incomplete, particularly since
1.20 the report acknowledges that the high water line has been 6.1
relocated landward from the mapped historic high water line in the DEQE files.

Figure 6.1-1 requires further explanation. Areas shown
within the low water line along piers 1 and 2 have not been 6.1
1.21 shaded. Are these areas considered private or commonwealth
tidelands? Commonwealth tidelands should be clearly identified on the plan.

Marine-Related Issues

Only cursory attention has been given to the potential for
1.22 conflicts between commercial and recreational boating. This
issue is a key concern with respect to the acceptability of a
mixed use maritime development in a designated port area. 3.6

The Boston Shipping Association comment has seriously challenged the Draft EIR's conclusion that "(n)o conflicts are expected to occur". Absent a clear showing that conflicts will not occur, the FEIR must make a serious effort to analyze the impacts of increasing recreational boating on port operations.

Likewise, the issue of wake protection for the recreational 3.6
marina has not been adequately assessed. The Boston Harbor
Associates recommendation that on-site measurements be taken of
the wake effects, from a representative fleet, during a range of 5.3
wind conditions should be pursued in the FEIR.

Hazardous Material Handling

The report has not specifically identified or quantified the 6.2
volumes of hazardous products that will be handled on an average
1.23 month or annually. What percentage of that material will
ultimately be handled as hazardous waste, which would require off
site disposal?

6.4.
1.24 A number of commenters are concerned about the fuel truck
movements on site. These concerns should be addressed.

To the extent possible, a draft of the Hazardous Materials 6.2 &
management plan should be included in the FEIR. The level of
detail presented in the draft is too general to ascertain the Appendi
adequacy of the proposed hazardous materials handling practices. F

Sewer

An analysis of peak, wet weather flows to the sewerage
1.25 system should have been presented in addition to the dry flows, 6.3.7
and impacts should be discussed.

According to the facilities plan the projected peak dry
weather flow is expected to decrease through the year 2025, even 6.3.6
with proposed development. This projection should be explained
in greater detail.

The Draft EIR has not incorporated any of the proposed
1.26 developments, e.g. Clippership Wharf and the Lobster Pier in the 6.3
sewer capacity analysis. These projected flows should become
background for the future, No Build sewer capacity computations.

1.27 Even without these projects, Table 6.3-3 shows a projected capacity deficiency in the 24 inch sewer in Bremen Street. This impact is considered to be insignificant without explanation or recommendation for improvement. 6.3.7

1.28 The Draft report has stated that the combined sewer overflow treatment facilities will be constructed, perhaps as early as 1988 to address a significant Boston Harbor water quality problem. The report appears to be overly optimistic, given the Massachusetts Water Resources(MWRA) comment, 6.3.6

> "The propose CSO facilities in East Boston near the project site may never be constructed, at least in their present configuration."

In light of this comment, the project's drainage impacts, both quality and quantity, on the CSO and Boston Harbor must be reconsidered. Alternative mitigation should be proposed for the project's drainage, based on the assumption that treatment facilities will not be available in the area.

1.29 The Draft EIR should have made a specific commitment to pump out facilities for marina users. What volumes will be generated over a boating season? 3.6 Table 6.3-2

Public Access

1.30 There appears to be an interest in providing public access to the site, but minimal detail of the access plan has been provided. Obviously, the recreational marina and piers is an area where public access would be inviting, however, it is less obvious how access will be treated in the maritime industrial areas of the site. The connection between public access from the East Boston Piers 1 through 5 and this site is also of interest. 6.5

Amenities proposed and access paths to and across the site should be shown on detailed site plans. Featured visitor attractions and important views should also be identified. Opportunities for transient boat dockage should be considered to promote waterside public access.

October 2, 1987
DATE

James S. Hoyte
JAMES S. HOYTE, SECRETARY

Comments received:

9/17/87	Boston Barge and Tugboat Company, Inc.
9/21/87	Steamship Authority
9/21/87	MAPC
9/22/87	Eastern Towboat Corp.
9/23/87	Mass. Bay Lines Inc.
9/24/87	New England Fisheries Development Foundation, Inc.
9/24/1987	Jeffries Point Harborside Neighborhood Association
9/24/87	Boston Shipping Association
9/24/87	Bay State Towing Company, Inc.
9/25/87	Massachusetts Water Resources Authority
9/25/87	MCZM
9/25/87	Boston Harbor Associates
9/24/87	Harborpark Advisory Committee
9/25/87	Environment Dept, City of Boston
9/25/87	MASSPORT
9/24/87	Boston Transportation Department
9/29/87	Puritan Fish Company
9/29/87	BRA
9/29/87	DEQE, Air Quality

JSH/NB/nb

BOSTON
REDEVELOPMENT
AUTHORITY

Raymond L. Flynn
Mayor

Stephen Coyle
Director

One City Hall Square
Boston, MA 02201
617 722 4300

2.0

SEP 25 1987

Secretary James S. Hoyte
Executive Office of
Environmental Affairs
100 Cambridge Street
Boston, MA 02202

Attention: MEPA Unit

Dear Secretary Hoyte:

Re: EOEA #6407 - Boston Marine Works (Draft Environmental Impact Report)

Pursuant to regulations implementing M.G.L., Chapter 30, Sections 62-62H, the Boston Redevelopment Authority has reviewed the above-referenced Draft Environmental Impact Report and submits the following comments.

2.01 The proposed Boston Marine Works project consists of the rehabilitation and reuse of the existing buildings and facilities of the East Boston Shipyard site for marine-related industrial and recreational uses and for office/commercial uses, including ship repair, storage and staging for the proponent's marine contracting business, and a marina with associated parking. The project site is within a designated port area as well as the recently-proposed East Boston Maritime Economy Reserve (MER) zone, and thus the proposed marina-dependent uses are consistent with these designations and with the City's and State's policies to protect Boston's maritime industrial base. 3.0

By reestablishing the ship repair function which formerly operated at the site, the project will restore many of the jobs to East Boston residents which were lost when the Boston Shipyard Corporation was forced to close their operations. In addition, under the terms of the proponent's lease with Massport, the marina portion of the site could revert back to large scale ship repair or other maritime-dependent industrial uses in the future should the market for these uses improve.

2.02 The project also will result in an increase in public access to the waterfront by opening up a large section of formerly private industrial waterfront to public use. Over 68,000 sq. ft. of new public access area will be provided where none existed previously. Provision of this public space thus promotes the goals of the BRA's Harborpark Program to provide access for the public to the water's edge. The marina itself will serve as an extension of Harborwalk in a previously inaccessible area. 3.0 & 6.5

Our specific comments on the Draft Environmental Impact Report follow.

Traffic/Transportation

The conclusion of the Traffic/Transportation section (p. 6-78) that the
project is a modest traffic generator that can fit into the existing roadway 6.4
system without significant impacts needs to be supported by further study.
The non-marine related office use appears to be a substantial generator of
2.03 traffic - approximately 265 vehicular trips per day. Attention should be
given to the project's impact on the Jeffries Point residential community;
additional focus should be given to measures to reduce traffic generation by
the project as well as measures to improve traffic flow, especially in the
Maverick Square area. This is especially needed since other waterfront
developments, such as the East Boston Piers project, will be coming on line in
the future and will place further demands on the local circulation system.
2.04 Pedestrian and vehicular circulation on the site, as well as public access
routes to the site, need to be specified and the interface with the various 6.4.7
site components evaluated. &

2.05 The Final EIR should also study the impact of truck traffic, both during the 6.5
construction period and for the long term. Because of the industrial and 6.4.1
commercial uses proposed, truck traffic could be a significant component of
the total vehicular traffic generated by the project. The Final EIR's analysis
should focus on identifying the volume, type, times, and routing of truck
2.06 traffic, and assessing its impact. An evaluation of street geometrics and
appropriate mitigation measures to handle this traffic also may be necessary.

2.07 The parking demand of the project needs further analysis. Should there be
insufficient spaces or the proposal to share spaces among the various uses 6.4.
not work out, parking demands will be placed on the adjacent residential
community. An analysis of project demand, particularly during peak utilization periods, should be included in the Final EIR to demonstrate the adequacy of the supply.

Lastly, the development program used for the traffic analysis (p. 6-36) needs
2.08 to correspond in all instances with the development program indicated in
Table 3.3-1 (e.g., no heavy industrial use is indicated for Phase I in
Table 3.3-1, but a warehouse/storage facility is indicated on page 6-36). 6.4

Sewage and Stormwater Disposal

The Draft EIR has indicated that 75% of the site land area and rooftops drains
directly into the Boston Harbor and will continue to do so (p. 6-34). Even
though drainage has occurred this way in the past, there must be a concerted effort to reduce this kind of drainage to prevent the runoff of oil,
grease, industrial solvents, and other pollutants that are related to the ship
2.09 repair operations and parking lots. The Final EIR should specify what measures will be employed to prevent water pollution from storm water runoff 6.3
from the site. For example, oil/grease traps are recommended for the storm
drains in the parking areas.

It is recommended that the marina provide facilities for the pump-out of sewage holding tanks of vessels. Such a facility would provide an important benefit since it would discourage private vessel owners from discharging sewage into the harbor.

2.10 The sewer capacity evaluation indicates that there will be a capacity constraint at one segment on Bremen Street (p. 6-31). What are the implications of this constraint (e.g., dry weather overflows)? Will this constraint be mitigated or removed, and by whom? Also, the peak total dry weather flows listed in Table 6.3-3 should correspond with the more detailed flow figures in Table 6.3-4 (e.g., for Marginal Street, 0.05 MGD vs. 0.07-0.09 MGD). 6.3.6

Hazardous Materials

2.11 The Draft EIR has briefly summarized the hazardous substances management plan. More detail is desirable, and more information is needed regarding the procedures for use and storage of the various hazardous materials and wastes, containment for spill control, and containment at the work sites themselves. A copy of the management plan should be appended to the Final EIR. Further information should also be provided on how to minimize any adverse water quality impacts caused by sandblasting operations. 6.2

2.12 Lastly, the location of fuel storage and pump facilities and the elements of the management plan governing the marina fuel facilities should be specified. In addition, the specific types of chemicals to be used as preservatives on the marina construction materials should also be identified (p. 6-15). 6.2

General

2.13 The marina is listed variously as 240 or 250 slips; the correct capacity should be used consistently. 3.6

2.14 (p. 5-15): Fig. 5.1-9 does not show the Fabrication Shop but the Pipe, Copper, and Sheet Metal Shop.

2.15 (p. 6-5): Fig. 6.1-1 does not show the layout of the proposed marina but rather the historic high and low water lines. 3.6 & FIGURE 3-6

2.16 It should be noted that the project also will require an Order of Conditions from the Boston Conservation Commission (Sect. 6.1).

2.17 A copy of the proponent's lease with Massport, or at least those parts relating to the 25-year use of the marina and return to Massport for future marine-dependent industrial use, should be included in the Final EIR. SEE APPENDIX D

In closing, it should be noted that the working Boston waterfront has seriously diminished over the last thirty years. The economic forces which have caused this decline in industrial maritime uses are still at work today. The re-establishment of the ship repair yard is a positive development which should be ~~applauded~~ and strongly encouraged.

Sincerely,

Paul Reavis
Assistant Director for Engineering
and Design Services

cc: Alan Perrault
Cashman Marine Enterprises

W. Sterling Wall
HMM Associates, Inc.

NB

MASSACHUSETTS WATER RESOURCES AUTHORITY
Charlestown Navy Yard
100 First Avenue
Boston, Massachusetts 02129

Telephone
(617) 242-6000

RECEIVED
SEP 25 1987
OFFICE OF THE SECRETARY OF ENVIRONMENTAL AFFAIRS

3.0

James S. Hoyte, Secretary
Executive Office of Environmental Affairs
100 Cambridge Street
Boston, MA 02108

Attn: MEPA Unit

Re: Environmental Monitor - September 11, 1987
EOEA No. 6407 - The Boston Marine Works

Dear Secretary Hoyte:

Having reviewed the Draft Environmental Impact Report for the Boston Marine Works in East Boston, we submit the following comments:

(1) Page 6 - 29

3.01 The EIR incorrectly states that the regulators and combined sewer overflows are part of the East Boston Branch Sewer (EBBS), which is an MWRA facility. These regulators and combined sewer overflows are part of the Boston Water and Sewer Commission system. 6.3

(2) Combined Sewer Overflows

3.02 The proposed Combined Sewer Overflows (CSO) facilities in East Boston near the project site may never be constructed, at least in their present configuration. Reviewing the proposed CSO facilities in a 1986 report to the MWRA, CH2M Hill recommended that all proposed CSO facilities in the Inner Harbor area not be constructed at this time, as the benefits vs. the cost and questionable technologies (swirl concentrators) should be reevaluated. In addition, a major siting conflict exists between the Bird Island CSO facility and the recently completed Harborside walkway and dock. 6.3.6

As the facilities plan for this work will not be completed until the end of 1989, it is safe to say that construction of any new CSO facilities is more than a few years away.

(3) Questions

3.03 - p. 6-27: How do the new East Boston facilities improve problems in the sewers? 6.3.9

3.04 - p. 6-31: How do the receiving sewers perform during wet weather? 6.3.8

3.05 - p. 6-33: How were existing peak dry weather flows determined? What allowance was made for stormwater flows? 6.3.7

We appreciate the opportunity to comment. Should you have any questions, please do not hesitate to call me at 242-0230.

Very truly yours,

Katina N. Belezos
Project Engineer
Technical Support Section
Engineering

KNB/gmc:bostmari

NB

MASSPORT TEN PARK PLAZA BOSTON MA 02116-3971 (617) 973-5500 TELEX 94-0365

massport

4.0 September 25, 1987

RECEIVED

SEP 28 1987

OFFICE OF THE SECRETARY OF ENVIRONMENTAL AFFAIRS

Steven C. Davis, Assistant Secretary
Executive Office of Environmental Affairs
MEPA Unit
100 Cambridge Street
Boston, MA 02202

In re: Boston Marine Works DEIR
EOEA No. 6407

Dear Assistant Secretary Davis:

I am writing you today to reiterate my strong support for the commercial maritime and marina development project proposed by Cashman Marine Enterprises, Inc. As you know, the Massachusetts Port Authority in its role as operator of the Port of Boston acquired the former Boston Shipyard property on Marginal Street in East Boston in December 1985. An open and competitive solicitation and review of proposals was held over a period of several months. In September 1987, the Authority's Board of Directors designated Cashman as the developer for the rehabilitation of the East Boston Shipyard for the purpose of preserving and enhancing the site for commercial and industrial maritime uses. The Authority negotiated a lease that will ensure the lasting operation of the site as a ship repair facility in order to meet that need in Boston Harbor.

I feel the proponent of this project has done a creditable job in formulating an aggressive business plan that meets the spirit of Massport's requirements for the site and is sensitive to community concerns. Because the marina will be used most frequently on summer evenings and weekends, and the ship repair and industrial operations will occur on weekdays, the uses are compatible from a traffic and parking standpoint. I encourage you to consider all of the components of Cashman's proposed business plan in light of the economic realities such a business faces. Cross-subsidization between the shipyard business and marina is the foundation for this viable maritime-dependent site use. 2.6 & APPENDIX C

4.01 In addition to voicing my continued unqualified support for the Boston Marine Works project as described in their DEIR, I also wish to provide clarification on two issues addressed in the document. First, the City of Boston Harborpark Program is mistakenly included (in Section 2.4 as well as other sections of the document) as a jurisdictional entity to which this project would be subject.

Massport property is exempt from City zoning; therefore, a special permit will not be sought from the BRA for this project. However, the Boston Marine Works project was presented by the proponents before the Harborpark Advisory Committee on September 16, 1987 as a courtesy in order to provide a forum for discussion of the project.

Second, the DEIR incorrectly asserts that this project is subject to Chapter 91 of the General Laws. The Authority's Enabling Act, Chapter 465 of the Acts of 1956, exempts the Authority from Chapter 91, particularly with respect to its actions as the state agency that is charged with promoting the Port of Boston. Despite this exemption, we will continue our practice of apprising the Chapter 91 Waterways Program staff of our site use plans. Both Massport and Cashman Marine Enterprises, Inc. remain dedicated to involving all interested agencies and community groups in the project.

4.02

2.6 & APPEN C

Other than these two issues, I feel the DEIR document adequately addresses the environmental impacts associated with the project.

Thank you very much.

Sincerely,

David W. Davis
Executive Director

4081R/RFE

JB

Metropolitan Area Planning Council

MAPC

110 Tremont Street Boston, Massachusetts 02108 (617)-451-2770

Serving 101 Cities & Towns in Metropolitan Boston

5.0

September 21, 1987

RECEIVED
SEP 24 1987
OFFICE OF THE SECRETARY OF ENVIRONMENTAL AFFAIRS

The Honorable James S. Hoyte, Secretary
Executive Office of Environmental Affairs
100 Cambridge Street
Boston, MA 02202

Attention: MEPA Unit

RE: Boston Marine Works Draft EIR, Cashman Marine Enterprises, East Boston, EOEA #6407 (MAPC #DEIR-87-57, Received August 21, 1987)

Dear Secretary Hoyte:

In accordance with the provisions of Chapter 30, Section 62 of the Massachusetts General Laws, the Council has reviewed the above Draft Environmental Impact Report.

This project includes reuse, rehabilitation, and reactivation of several existing buildings and a graving dock in the East Boston shipyard. In a second phase, proponents plan to construct a 240-slip marina and additional office space.

The Council would like to begin by commending project proponents for a concise, well-organized Draft EIR. We feel that this EIR addresses nearly all the issues raised in the Secretary's certificate. After reviewing this document, we have only a few questions and comments.

5.01 First, while we recognize that site drainage patterns may not change significantly, this is an opportunity to express concern that 75 percent of the site drains directly into Boston Harbor. In the Final EIR, we would like to see a characterization of this runoff, especially that from parking lots. Are grease traps and sedimentation basins in use? 6.3 & 6.3.9

Second, the Council agrees that plans for the East Boston Piers are not far enough advanced that impacts from that project can be considered in the Boston Marine EIR.

5.02 Last, the proponents are to be commended for preparing a hazardous waste management plan. In the FEIR, the Council would like to see more specific information on the title of the person responsible for plan implementation, administration of the plan covering any leased areas/buildings, spill containment in the different parts of the shipyard, and methods proposed to contain VOCs from painting operations. We would also like to know if the proponent has worked with DEQE-DHW on the components of the plan and all applicable regulations. 6.2

Thank you for the opportunity to comment on this Draft Environmental Impact Report. The Council looks forward to reviewing the Final EIR on this project.

Sincerely,

David C. Soule
Executive Director

DCS/JCW/mlm
cc: Richard Dimino, MAPC Rep., Boston
Paul Reavis, BRA
Cashman Marine Enterprises
HMM Associates, Inc.
Lori Thayer, MAPC Staff
Judith C. Wiegand, MAPC staff

N15

BSA

The BOSTON SHIPPING ASSOCIATION, Inc.

223 Lewis Wharf, Boston, Mass. 02110
Telephone (617) 523-3762

6.0

RECEIVED
SEP 25 1987
OFFICE OF THE SECRETARY OF ENVIRONMENTAL AFFAIRS

September 24, 1987

Secretary James Hoyte
Executive Office of Environmental Affairs
100 Cambridge Street
Boston, MA 02202

Re: Boston Marine Works (Cashman Marine Enterprises)
EOEA No. 6407

Dear Secretary Hoyte:

The Boston Shipping Association (BSA) thanks you for the opportunity to comment on the Draft Environmental Impact Report (DEIR) submitted for the Boston Marine Works, EOEA No. 6407.

We offer these comments because the port and the Commonwealth can ill afford to surrender a deep water industrial facility at a time when marine construction activities are increasing, when shipyard workers in the Commonwealth may be displaced and when competition for scarce deep water piers is becoming acute. Despite the eagerness with which we greeted Massport's purchase of this property and the announcement by the proponent that it would retain this site as a shipyard, we find the DEIR to be seriously flawed and the

project it describes disturbing in its policy implications.

Our principal objections are as follows:

6.01 ° The marina will cause a hazard to navigation and will adversely effect shipping in the main channel. 3.6 6.1.1

6.02 ° The proponent has failed to support his assumption that the ship repair facility cannot be expanded and has failed to consider the site for other maritime industrial uses. 4.2

6.03 ° The proposal lacks any specific information on the economic interrelationship of the segments included therein and fails to provide the necessary assurances that maritime uses, particularly maritime industrial uses, will be fostered and maintained. 3.1 3.3

6.04 ° The proposal severely underestimates the parking needs and negative landside traffic consequences of the project. 6.4.5

6.05 ° The proposal reflects a segmentation of the waterfront rather than an overall planning effort. 3.1 3.3

6.01 1. THE MARINA WILL CAUSE A HAZARD TO NAVIGATION AND WILL ADVERSELY EFFECT SHIPPING IN THE MAIN CHANNEL.

Contrary to the assertions of the draft EIR the presence of a 240 slip marina adjacent to the main ship channel clearly does present a hazard to navigation. The proponent is unrealistic in its statement on page 6-4 that "no conflicts are expected to occur" with the deep water shipping which uses that channel. Small pleasure craft do not merely sit at a slip; they go out into and through the adjacent waters. A marina located at the proposed site will put at least 240 small 3.6 6.1.

vessels into a main ship channel at a point where it is already crowded with pleasure craft exiting the harbor. This would both present an increased risk of collision and serve to slow the passage of deep water vessels in the main ship channel. If these vessels cannot maintain their speed at that point, not only will the purpose of a ship channel be defeated but public safety will be sacrificed. The increase of marinas is already endangering deep water commercial shipping and the boating public. Many users of recreational boats are not familiar with harbor regulations; haphazardly piloted small pleasure craft cluttering the shipping channel during the transit of major vessels is no longer an uncommon sight. Some accidents have already occurred and we are concerned that the unconsidered growth of marinas will result in loss of life and greater destruction of property.

Beyond the fact that the DEIR fails to consider the presence of Anchorage No. 1, there is a serious risk of adverse wave action and a resulting impingement on traffic in the ship channel. Contrary to the proponent's statement on page 6-5, no widely recognized 10 m.p.h. speed limit exists in the harbor. Rather, as stated by the Boston Port Operations department of the United States Coast Guard, the standard is merely a reasonable speed which will not create a wake that would damage

vessels moored along the shore. Given this circumstance and the further fact that the proponent's own wave study does not indicate that full wave protection has been achieved, the proposal clearly presents a risk that maritime traffic would be impeded not only by the presence of small boats in the channel but also by the need to reduce vessel speed in the channel to an operationally unacceptable level. This would have an adverse consequence on the viability of deep water shipping in the Port of Boston. Small harbor service vessels, such as the tugs and water shuttles whose numbers are now increasing, would also be impeded. To exist economically these vessels must operate at speeds which could cause a substantial wake. Moreover, the slowing of channel traffic would also raise the spectre of a serious threat to public safety. Large tankers and other deep water vessels, are substantially less maneuverable at lower speeds and therefore are less able to respond with appropriate collision avoidance techniques in an emergency. With increasing likelihood the possibility is presented of a major casualty caused when a tanker, or other vessel carrying environmentally sensitive cargo, is forced to leave the deep channel to avoid an errant pleasure craft. In these respects, from a marine operational perspective, the

installation of a substantial marina at this point in the harbor presents clear dangers.

6.02 2. THE PROPONENT HAS FAILED TO SUPPORT HIS ASSUMPTION THAT THE SHIP REPAIR FACILITY CANNOT BE EXPANDED AND HAS FAILED TO CONSIDER THE SITE FOR OTHER MARITIME INDUSTRIAL USES. 4.2

The proponent has offered only ill-documented and unsupported conclusions in justification of its rejection of alternative no. 3, which alternative would have allowed for an expanded ship building/ship repair facility at the site. This is particularly unfortunate because the proposal is being advanced at the same time that shipyard workers in Quincy may be deprived of that facility; when it is realized that construction of the third harbor tunnel may take the dry dock in South Boston, this irony becomes even more acute. Rather than documenting the reason for the prospective diversion of this site, or even providing the data which led Massport to select the proponent, the proponent in Section 4.3 and 4.4 of the draft report seems to suggest that the mere fact that he was selected as the successful bidder by the Massachusetts Port Authority is sufficient to conclude that only these operations which he has proposed can be conducted at the site. No matter how well considered and well grounded Massport's selection

process was, such a suggestion effectively abrogates the state's independent regulatory role and makes environmental policy simply the product of an agency bidding process.

Further, the proponent has given no consideration to th development on the site of other maritime industrial uses s as fish processing, cement plants, and staging areas for th multitude of maritime construction projects which the harbo will soon host. That there is now an acute shortage of dee water facilities in the port is illustrated by the competit which is now ongoing for use of sites at the Boston Marine Industrial Park and by the need of the Massachusetts Water Resources Authority to obtain Piers 48, 49 and 50 in Charlestown. The Commonwealth itself will soon be facing need to obtain waterfront sites as it conducts more and mo projects from the water's edge and particularly as it proc with the third harbor tunnel. Staging areas are required these projects as well as for private development projects such as the Fan Pier, which are being urged to conduct as construction activity as possible from the waterside. The new harbor activities will in turn bring additional vessel particularly tugs and barges, looking for homes in our por These port demands must be met before one can properly co the advancement of incremental waterfront gentrification

maritime industrial sites. In this respect again, the DEIR is seriously deficient in its failure to consider the needs of the region for additional maritime industrial sites.

6.03 3. THE PROPOSAL LACKS ANY SPECIFIC INFORMATION ON THE ECONOMIC INTERRELATIONSHIP OF THE SEGMENTS INCLUDED THEREIN AND FAILS TO PROVIDE THE NECESSARY ASSURANCES THAT MARITIME USES, PARTICULARLY MARITIME INDUSTRIAL USES, WILL BE FOSTERED AND MAINTAINED. 3.1 33

The proponent suggests that the non-maritime uses and recreational maritime uses will economically benefit the maritime industrial uses to which the site should be devoted. We appreciate both the desire to create an economic synergy between diverse uses and the advantage of a private sector structure which will aid an important maritime industrial project. We share fully Massport's goals in obtaining this property and look forward to its revitalization. However, the proposal fails to provide any specific information on the economic interelationship of these elements, is obscure as to the precise nature of the non-maritime uses and suggests that marine related uses (other than the marina) will be accommodated only to the extent that it is, in the developer's subjective judgment, economically feasible. The draft report, therefore, lacks the specificity required and seems merely to ask leave to develop the property in the proponent's best economic interest

regardless of existing and impending state and local policies favoring preservation of maritime industrial sites.

Despite the proponent's comments on pages 6-16, 17 of the DEIR, the proposed uses (other than the shipyard itself) do not seem to comport with the proposed maritime economy reserve zone which the East Boston community and the Haborpark Committee have recommended for this location.

The DEIR contains little information indicating that the project as a whole is entitled to a Chapter 91 licence and the proponent's statements disputing DEQE's placement of the high water line are unsupported by any data.

The proponent's conclusion that this project does not conflict with the policies for Designated Port Areas is seriously mistaken. As indicated above, the proposed marina would indeed conflict with adjacent maritime industrial uses. Moreover, it is disingenuous to suggest, as the proponent does, that a 25 year lease for a marina, restaurant and office buildings is only an interim use.

6.04 4. THE PROPOSAL SEVERELY UNDERESTIMATES THE PARKING NEEDS AND NEGATIVE LANDSIDE TRAFFIC CONSEQUENCES OF THE PROJECT. 6.4.5

The DEIR appears deficient in its technical information on several points, including soil toxicity, wave action and sewage requirements. However, its technical limitations are most

striking in its underestimation of the need for parking on site and the negative impact presented by the traffic to be generated by this project. Apart from the fact that the traffic data is not sufficiently comprehensive, there is virtually no consideration given to the cumulative effect of the traffic from this parcel and the traffic from the adjoining Massport parcels. The site itself does not appear to have adequate parking and the mitigation measures suggested by the proponent have not been adequately detailed.

6.05 5. THE PROPOSAL REFLECTS A SEGMENTATION OF THE WATERFRONT RATHER THAN AN OVERALL PLANNING EFFORT. 3.1 3.3

Unfortunately this proposal represents a segmentation of waterfront development rather than an overall planning effort. There is no evaluation of the overall development program which should be adopted for this area. Indeed, although the proponent had referenced its commission from Massport, it has failed to provide a copy of the lease under which it is to act. We question not only the propriety of a segmented process of consideration but also the wisdom of a scheme which advocates such piecemeal development of an important harbour resource. Certainly the principles which underlie both 301 CMR 11.16 and good planning are offended by this restricted approach.

CONCLUSION

There is a scarcity of land currently available for maritime industrial use and a growing conflict in the use of the harbor itself. Land slated for the working waterfront should remain dedicated to that use, especially in light of the ongoing and projected expansion of the maritime economy. The free passage of commercial shipping, which is essential to the economics of the entire region, should not be impeded by private yachts. While a creative development plan for this site is necessary, the best interests of the Commonwealth are not served by "rooftop dining terraces" as described on page 3-15 of the DEIR. This site, which has served as a part of the commercial deep water port for over 140 years, should not lightly be dedicated to "downtown employees who may wish to go boating after work" as suggested on page 7-8 of the DEIR.

We deeply appreciate the prompt efforts of Massport which saved this important site for the Port and we applaud the proponent's efforts to keep a viable shipyard in the Port of Boston. We continue to look forward to these commitments to maritime industry culminating in a successful project. However, for the reasons stated above we ask that you find the present Draft Environmental Impact Report to be inadequate because it does not directly and fully address the public

issues and vital maritime opportunities elemental to this endeavor.

Very truly yours,

Boston Shipping Association, Inc.

Arthur Lane

Arthur Lane
President

cc: Cashman Marine Enterprises

NB

COASTAL ZONE
MANAGEMENT

The Commonwealth of Massachusetts
Executive Office of Environmental Affairs
100 Cambridge Street
Boston, Massachusetts 02202

7.0

MEMORANDUM

TO: STEVE DAVIS, DIRECTOR, MEPA UNIT

FROM: RICHARD F. DELANEY, DIRECTOR, MCZM

DATE: SEPTEMBER 25, 1987

SUBJECT: EOEA #6407, BOSTON MARINE WORKS, EAST BOSTON

The Massachusetts Coastal Zone Management (MCZM) Office has completed its review of the Draft Environmental Impact Report (DEIR) for the Boston Marine Works project. The MCZM Office finds the submitted DEIR is incomplete and that it is therefore inadequate in providing this office with the necessary information that is required to perform a substantive review of the potential impacts of this project.

Within the DEIR, the proponent has submitted an incomplete 6.4.6
7.01 traffic study which completely ignores the truck traffic that will be generated by the marine contracting business that is proposed to be operated at this site. The DEIR does not include traffic
7.02 impacts of other developments in the vicinity of this site, and it 6.4
provides only the most rudimentary discussion of mitigation measures (i.e. there are no details as to how, when, and where the water taxi is to be located and operated out of this project site) for relieving the potential traffic congestion that would be associated with this site development. The parking study is also deficient in that it does not clearly delineate: (1) where the 6.4.5
7.03 parking spaces will be located on the site (even though this was specifically requested in the MCZM's comment letter on the ENF); (2) where the trucks associated with the marine contracting business will be parked; (3) how the limited number of parking spaces on the site will be allocated amoung the various users and lastly; (4) methods for mitigation of parking lot overflow onto the adjacent already conjested East Boston streets.

7.04 The development of a marina of the scale, size, and level of investment, that is proposed in the DEIR, within a Designated Port Area (DPA), clearly signals to this office that the marina will, 3.5
as proposed, pre-empt this area, (which includes the two longest piers at this site), from any marine industrial use for a minimum &
of 25 years. This pre-emption may even occur for a longer period
4.2

of time but it in not clear what options exist for renewal of the 3
7.05 lease with Massport. The DEIR does not provide sufficient
detail as to how the industrial site will be seperated from the 3
proposed recreational site. The proponent has also been unable to
7.06 provide this office with any clear definition (in economic terms) 4
as to why a marina of this scale is required at this site, or at
what point the proponent will remove the marina to accomodate
marine industrial uses, should the need arise. Presently, the
7.07 Boston metropolitan area is gearing up for three major
construction projects (Deer Island Wastewater treatment Plant, 4
Depression of the Central Artery and Third Harbor Tunnel, and the
Fan Piers). These three mega-construction projects will be 8
heavily reliant on the use of the watersheet, for transportation
of materials and personnel. Therefore, it is the opinion of this 6
office that a marina, if allowed within this DPA, should be
conditioned so as to not pre-empt the use of these piers in the
near future, for use as possible berthing areas for the vessels
associated with these construction projects. The proponents plan
does not address these serious concerns of short-term pre-emption
because the DEIR strictly looks at a 25-year minimum (timeframe)
for the proposed marina.

The DEIR implied that public access will be provided at the
7.08 site through its incorporation into the Harborpark system. 6
However, the DEIR is severely lacking in providing the necessary
information, in even the most rudimentary form, i.e. site plans,
outlining connection to the surrounding neighborhood, methods of
separation to be employed between the industrial portion of the
site and the recreational portion of the site, etc.. To simply
state that this project will become a part of the Harborpark
system is not sufficient documentation to allow this office to
review the public access characteristics of this project. MCZM's
acceptance of this proposed public access component of the project
will require much more detailed analysis, to ensure public
enjoyment, as well as public safety. 6

Lastly, the DEIR has left unanswered some serious questions
7.09 as to how this project may adversely impact water quality. The
DEIR does not answer the question as to whether or not TBT based
paints will be either stored or used on site. The DEIR states
that the proponent has no plans for upgrading existing drainage
7.10 and catch basins. Has the proponent assessed the present 6
condition of this drainage system? A description of the present
system and its potential impacts on water quality should be
presented. The DEIR has provided no numbers as to the projected
amount of sewage which will be pumped out of both recreational an
commercial boats at this site. The DEIR also indicates that ther
7.11 will be a fuel truck located on site. The proponent should
indicate how large this fuel truck will be (capacity), where 64.
it be stationed and whether or not it will travel out on the pier
at this site?

Due to these several severe deficiencies of the submitted DEI this office cannot accept this DEIR as adequate, even on a preliminary basis, for our review. The Secretary's Final Record of Decision, section VII (Scope of EIR) specifically states that the proponent must consider and address comments raised by the MCZM office pertaining to this project. The DEIR presented represents a serious lack of consideration for concerns which were raised by this office and highlighted in the Secretary's decision. The entire EIR process is severly hindered when information of sufficient detail is not provided by the proponent which thereby results in unnecessary delays.

cc: Charlie Natale, DEQE/DWWR, WRP
Anne Alyward, Massport
Judy Perry, DEQE/DWPC
Kevin Kilduff, Boston Conservation Commission, Environmental Department

NB

Jeffries Point Harborside Neighborhood Association

8.0

RECEIVED
SEP 25 1987
OFFICE OF THE SECRETARY OF ENVIRONMENTAL AFFAIRS

24 September, 1987

Secretary James Hoyte
Executive Office of Enviromental Affairs
100 Cambridge Street
Boston, Massachusetts 02202

Attention: MEPA Unit, Steve Kaiser EOEA #6407

Dear Mr. Secretary:

The Jeffries Point Harborside Neighborhood Association is submitting the following comments on the Boston Marine Works Draft E.I.R. We request that this document be rejected and that more complete information be included in a new draft. Numbers in parentheses are page or figure numbers.

8.01 1. There is confusion concerning the different entities of: Cashman Marine Enterprises, J.M. Cashman Marine Contracting and Boston Graving Dock Corporation. The function of each company (and any other planned subsidiaries) needs to be explained fully. (3-4) 3.0

8.02 2. Discussion of "storage" is incomplete. (3-11) What is stored and for how long must be detailed and address concerns regarding hazardous materials and/or food storage with its related odor and rodent controls, etc. 3.5 6.2

8.03 3. Parking and traffic patterns for the site are non-existent in the document. Diagrams need to be included for parking, storage, and circulation. Any duplication of space use (such as boat storage in parking areas) should also be diagramed. (3-16) Long term parking for marina users, overflow parking location possibilities, and the allocation of parking for office and industrial tenants needs to be addressed. 6.4.5 6.4.4

Historically this site was served by a trolley on Webster
Street and rail access. Then when these means of access were
no longer available traffic from the shipyard workers,
deliveries of materials, plus the vehicles of the service
personnel from the ship being repaired often made
8.04 neighborhood traffic intolerable. The MBTA Route 120 on 6.4.2
Sumner Street can only mitigate car traffic if the "Golden
Stairs" from the Golden Stairs Park down to Marginal Street
are maintained year round. The City, who owns the stairs,
8.05 does not maintain them. More lighting is also needed. The 6.5
proponent must commit to the upgrade of the stairs and their
year round maintenance. Van service should also be defined
and guaranteed.

It is imperative to keep all truck traffic to an absolute
8.06 minimum. The narrow local streets will not accommodate the 6.4.(
large tractor trailers and "piggy backs" that are on the
roads today. On several occasions recently, trucks
(including "piggy backs") making deliveries to the Shipyard
have had traffic blocked for over an hour at the corner of
Sumner and Orleans while trying to negotiate the corner. In
addition, several recent condominium projects at the corner
8.07 of Orleans and Marginal Streets are further aggravating the 6.4.
parking congestion in the neighborhood. Also the document
should show space allocation for truck maneuverability on the
site along with the parking diagrams. Other than new vessel
delivery trucks, <u>no mention of truck traffic is made</u>
8.08 <u>throughout this Draft Report</u>, but must be included for this 6.4.(
document to be accepted. This is a serious omission.

Our association does not feel the traffic study is adequate 6.4
8.09 in addressing the completion of this proponent's project in
conjunction with the development of the Massport Piers I-V
and the Clippership Wharf development at Maverick Square.
The analysis of this project by itself is segmented planning
and should not be allowed--especially since the Massachusetts
Port Authority also owns the adjacent property and is in the
process of developing that site.

Overflow parking which used to occur at the shipyard was
8.10 accommodated on the backland of pier V and Marginal Street. 6.4.
These alternatives will no longer be available as an option.
(3-23, 6-39) A breakdown of hours along with the above
mentioned diagrams for parking and maneuverability should
guarantee the lack of need for parking on neighborhood
streets.

Alternate access routes, including the railbed with a new 6.4
8.11 roadway on the adjacent pier property and/or use of South
Bremen Street should be analyzed. Barging of supplies to the
shipyard must be mandatory and spelled out in the document.
A commitment of no transfers of materials, trucks, or people 6.4
8.12 through the East Boston community in connection with any
future projects, such as the third harbor tunnel, depression

of the Central Artery, or the sewage treatment projects, must be included.

4. The restaurant is of particular environmental concern 3.6
8.13 regarding the hours of operation, indoor or outdoor seating, trash disposal and removal, rodent control and entertainment noise. These issues need to be addressed in the Document. (3-15)

5. Land storage of boats needs to be spelled out in regard 3.6
8.14 to the marina operation or another marine operation. (3-16) Any inside storage of boats needs to be defined.

6. Crane operations need to be addressed. Concerns are 6.5
8.15 hours and types of operation, public access, and safety procedures.

7. Safety should be addressed for the entire site. 6.5
8.16 Concerns include parking, cranes, lighting, signage, and security.

8. Launch service commitment needs to be made and a full 6.4.8
8.17 discussion concerning accessibility, parking, circulation, hours of operation, subsidies, costs, location, and
8.18 destination. (3-17)

9. Diagrams showing public access and use areas (such as 6.5
8.19 fishing and picnicking) need to be included for clarity.

10. Hours of operation for the various uses and users need 3.0
8.20 to be included.

11. Comparison of the proposed marina to other urban marinas 3.3
8.21 of this size in terms of operations should be required.

12. Although no mention is made of large ship repair work, we 3.3
8.22 understand that Cashman Marine has applied for eligibility to bid on U.S. Navy contracts. Size and kinds of ships must be defined as well as any possibility of anticipated personnel 3.5
vehicles adding to the traffic figures which need to be
8.23 included and shown in figuring the parking analysis, site 6.4.5
use, etc.

13. The proponent should also discuss the possible effects 3.6
8.24 and mitigation measures of having a 240 boat marina, a large marine contracting business and a large Navy ship at the site 6.1.5
all at the same time.

14. The proponent should also discuss plans for the 3.5
8.25 remaining floating dry dock. Now that it has been refloated, will it be scrapped, repaired and sold, or repaired and used on site? (4-5)

8.26 15. The quarantees that the site will be used as stated by the proponent are of concern to the neighborhood. Written commitments that the site will not be used as a staging, transfer site or barge loading area for future major projects must be required. A copy of the lease agreement between the proponent and the owner should be a part of this document for clarification of lessee/lessor terms, options and responsibilities. 3.3

8.27 16. There is confusion regarding Building 8. Figures 5.1-8 and 5.1-9 appear to be the same cross-sectional view. It is unclear on the plans for the "West" bay, i.e. the area also called the Fabrication Shop. (5-12, 5-13, 5-14) This should be clarified. 3.2

8.28 17. Sand blasting and grit control needs to be addressed, particularly regarding the surrounding neighborhood and for the boats in the marina. There is the possibility that sand blasting could be a conflicting use with a marina in a designated port area. 6.2

8.29 18. In several places, but specifically on page 6-13, the proponent discusses a 25-year lease. We have concerns about renewable terms and who has the options, the lessee or the lessor. The interim marina use may actually assist Massport in returning the piers to large ship uses, but not anytime soon if proponent has a 25-year option to renew after the first term. (6-13, 6-17) 3.3 APPEND D

8.30 19. There are several areas of concern regarding fuel and petroleum products. First, there is concern about proponent s plans for petroleum tank trucks delivering products around the site. Will the truck be allowed on the piers and bulkheads that the proponent states "the condition of which is undetermined?" (5-16, 6-19) Also it must be stated if the trucks will be used for fueling ships, what size ships, how frequently, etc. A guarantee of barge delivery of fuel to the site should be stated. 6.2

8.31 20. The types of paints and any other potential hazardous or toxic materials should be specified as well as the disposal methods for such substances. The controls over the marina, the types of materials allowed and the disposal methods should also be specified. 6.2

8.32 21. Pumping of sewage off of ships and boats--in what quantities and methods of removal from the site and disposal must be addressed. A pump out station must be made a requirement for this site considering the proposed number of pleasure and commercial vessels that are to be accommodated here. 6.3

8.33 22. The access and egress to the former Immigration Building needs to be fully detailed. This is completely omitted. 6.4.

8.34 23. It should also be stated that no fish processing or handling in any other form than the already agreed to operation of boxed fish transfer will occur at the site. 3.3

3.5

8.35 24. Training programs for neighborhood residents as previously promised require strong commitments. This needs to be more forcefully stated. 3.3

8.36 25. Public amenities other than access are totally ignored in the document. Public docking and restrooms should be included and clearly defined. 3.6 & 6.5

8.37 26. This Draft Report makes bare mention of the plans for the remaining East Boston Piers I-V. On page 6-70 the proponent states "that this project has been analyzed on its own merits, without forcing it to bear the access requirements of the yet undefined future development of the East Boston Piers." The basic outlines of the Lobster Pier and park have been developed and Massport has just released a request for proposals for the remaining portion of the site. Reasonable projections should be possible at this point and should be included so that this major development site can have continuity and an end is put to segmented planning. 6.4.4

Answering these comments will require additional information and material that should have been included in this Draft Report. Mr. Secretary, I suggest that the proponent's Draft E.I.R. be rejected and that he be asked to provide complete studies, plans and commitments to the neighborhood before any further milestones in the Review Process be reached.

Sincerely,

M. Blossom Hoag

M. Blossom Hoag, Chair
JEFFRIES POINT HARBORSIDE
NEIGHBORHOOD ASSOCIATION

/MBH

cc: Massachusetts Port Authority
City of Boston, Mayor's Office of Neighborhood Services
Boston Redevelopment Authority, Harborpark Committee
PZAC, East Boston
City of Boston, Department of the Environment

HARBORPARK ADVISORY COMMITTEE

RECEIVED

SEP 29 1987

OFFICE OF THE SECRETARY OF
ENVIRONMENTAL AFFAIRS

September 24, 1987

Secretary James S. Hoyte
Executive Office of
Environmental Affairs
100 Cambridge Street
Boston, MA 02202

Attention: MEPA Unit EOEA # 6407 - Boston Marine Works

Dear Secretary Hoyte:

The Harborpark Advisory Committee (HPAC) has reviewed the Draft Environmental Impact Report for Boston Marine Works in East Boston (Re: EOEA# 6407) and is pleased to offer the following comments:

On September 16, 1987 representatives from Cashman Marine Enterprises presented plans for their development proposal to the Harborpark Advisory Committee. HPAC wishes to report that it is supportive of the water dependent industrial aspects of this proposal. The continued use of the East Boston Ship Yard as an industrial ship repair opperation is a major step toward maintaining the viability of Boston Harbor as a regional port. Nevertheless, we believe that public agencies such as Massport which control waterfront industrial parcels be cognizant that these limited sites are critical to water-dependent industries. Industries such as fishing, shipping, water transportation and related services can exist only on waterfront properties. The committee feels that some 3.6 &
9.01 of the non water dependent industrial aspects of this proposal may 4.2
be inappropriate for this site.

As you know, HPAC has been working for more than a year with Boston
9.02 Redevelopment Authority staff in attempting to create new zoning districts called Maritime Economy Reserve Zones (MER). When establised, these zones will serve to protect maritime related industries in Boston Harbor. The Cashman site is one of the proposed locations to be mapped under this amendment and it is questionable as to whether some of the non water dependent industrial aspects of this development will conform to the allowed APPENDIX C
uses under the MER

In addition, The East Boston Shipyard is located in a Designated
9.03 Port Area (DPA), and as such is subject to specific development guidelines by the Massachusetts Office of Coastal Zone Management. 3.6
It is the intent of these DPAs to assign priority to maritime dependent industrial and commercial uses in coastal areas. HPAC is 6.1.1
seriously concerned that the proposed recreational marina, restaurant and commercial office space may not be consistant with the policies for development outlined under the DPA.

The following describes some of our concerns with the draft EIR:

9.04 1) MASSPORT Contractual Agreements - It is unclear what the actual lease agreements and options offered by MASSPORT would achieve in protecting land and water areas for future port-related maritime uses or in perpetuating the recreational marina, restaurant, and office components of the project. The developer indicated that MASSPORT will be approving future tenant leases, but this approval process will not involve the same public scrutiny process to which the developer must now submit. APPEND D

Page 3-19 of the Draft EIR states a commendable goal which the HPAC heartily endorses:

"The rehabilitation and operation of all existing buildings shall be carried out in a manner that serves the existing and future needs of the Port of Boston. This will be done in a manner that does not pre-empt Massport's option to return the entire site to a large scale ship repair facility once the proponent's lease has expired."

9.05 However, we are unable to understand how rehabilitation of many of the structures for additional office space or for a 100 seat restaurant will accomplish that goal. We request that the developer be asked to demonstrate how this protection will be offered. We would like to see such features incorporated in the site plan. 4.2

9.06 We would also recommend the provision of a public landing for drop-off and access on the waterside by smaller boats in the Harbor. 3.6

9.07 2) Recreational Marina The HPAC believes that the proposed 240 slip recreational marina is too large and could exacerbate navigational conflicts with ships and large commercial vessels. It will also require a high percentage of the on-site parking spaces. 3.6

9.08 Consideration should be given to reducing the number of recreational boat slips and providing more dockage area, year-round, for Inner Harbor commercial vessels, such as tow boats, the fishing fleet, excursion and shuttle services, barges, dredges, and other working vessels. There is a severe shortage of dock space in the harbor for for these types of vessels and a using a portion of this site for large vessel dockage could provide a solution to this problem. Such vessels would require less parking, would generate less land-site traffic than recreational boats and might help to buffer the industrial operations from the recreational areas. 3.6

9.09 3) Public Access - HPAC notes that the proposed public access to the waterfront is available only at the head of and along Pier 1. Although we recognize that uncontrolled public access to the maritime industrial areas may be undesirable for security, safety, and operational reasons, we believe that restricted public access can be achieved through roof-top observation decks, fenced pedestrian walkways, and/or guided tours during non-operational hours. 3.6 & 6.5

9.10 4) Traffic/Transporation - The conclusion of the Traffic/Transportation section, i.e., that the project is a modest traffic generator that can fit into the existing roadway system without significant impacts (p. 6-78), is not substantiated by development. The analysis indicates that at several intersections, LOS will be significantly degraded (See Table 6.4-8). Therefore, serious attention should be given to measures to reduce traffic generation by the project, as well as measures to improve traffic flow, especially in the Maverick Square area. 6.4.4

9.11 Peak hour traffic to and from the project site could pose a negative impact upon the residents of Jeffries Point. The office use appears to be a substantial generator of this traffic - about 40% of the Phase II in or out trips. 6.4.4

9.12 An important omission in the DEIR is any discussion of truck traffic, both during the construction period and for the long term. Because of the industrial and commercial uses proposed, truck traffic could be a significant component of the total vehicular traffic generated by the project and thus negatively affect the adjacent Jeffries Point residential community. 6.4.6

The Final EIR should include an analysis of truck traffic, indentifying volume, type, times, and routing, and assessing the impact. An evaluatioc to appropriate mitigation measures may be necessary.

9.13 Parking assumptions relating to the need and calculation of on-site parking spaces is questionable. For 240 boat slips and other marine-dependent recreational uses (boat sales, repair and water transportation services) only 95 spaces are allocated. Since this area is proposed to be shared with temporary outside boat storage, controls are needed to assure that the latter uses do not usurp the former area. It is also unclear where parking spaces for the proposed 100-seat waterfront restuarant would be provided. 6.4.5

Office and industrial uses are lumped together in the parking analysis, making it difficult to determine user requirements. The Final EIR should clearly break down all proposed uses of the project into discrete elements, specify how many parking spaces are being provided for each of those elements, describe, in detail, through a proposed parking management plan, at what times and how much parking would be shared and state what restrictions are offered to assure the effective implementation of this parking management plan.

9.14 Assumptions are made, relating to extensive carpooling and to the hiring of East Boston residents, some of whom are expected to walk or use transit to get to work. These are questionable, because of the difficulty of enforcement and because of the distance to the Maverick Street Station. 6.4.8 & 7.5

Since there are no private or public garages nearby to absorb peak parking demands, overflow parking would spill out to the public right of way, which is already seriously impacted by curbside parking. Therefore, parking assumptions relating to the need and calculation of on-site parking spaces need careful scrutiny.

5) <u>Surrounding Environs</u> - Information is needed about the proposed 3.6
9.15 use of abutting properties, under the control of MASSPORT. Similar
to land use conflicts, water use conflicts can occur between
waterfront industrial and non-industrial activities or between large 6.1.1
vessels and small vessels sharing common navigational channels, such
as the main shipping channel and the access channel between the site 6.5
and the East Boston Piers.

<u>Summary</u>

The mixture of two distinct and diverse marine uses (industrial and recreational) in a single project poses unique questions and issues. We hope that some of the questions asked in this letter will be answered adequately and that some of the issues can be resolved so that the development project can revitalize a dormant stretch of Boston's Inner Harbor. The HPAC heartily supports the maritime industrial/commercial components of the project, but requests more justification for the non-maritime industrial components. It also requests that the proponent demonstrate how development of such areas will be done so as not to preclude use of the whole site in the future for maritime industrial/commercial uses.

Sincerely yours,

L. M. Downey
Chair, Harborpark Advisory Committee

CC: Mayor Flynn
David Davis Director, Massport
Stephen Coyle, Director BRA
Ron Catina, Chair, East Boston PZAC
John Leigh, Harbor Planning and Dedveloopment
Lucy Ferullo, Mayor's Office
HPAC

September 25, 1987

10.0

City of Boston
The Environment
Department

Raymond L. Flynn
Mayor

Lorraine M. Downey
Director

City Hall Room 805
Boston, Massachusetts 02201

Mr. James Hoyte,
Secretary
Executive Office of Environmental Affairs
100 Cambridge Street, 20th Fl.
Boston, MA. 02202

RECEIVED
SEP 29 1987
OFFICE OF THE SECRETARY OF ENVIRONMENTAL AFFAIRS

ATTN: MEPA Unit, Nancy Baker
RE: EOEA #6407 - Boston Marine Works

Dear Secretary Hoyte:

The City of Boston Environment Department has reviewed the Draft Environmental Impact Report for the Boston Marine Works and would like to offer the following comments:

Proposed Marina

10.01 1. The site is currently a Designated Port Area under the Office of Coastal Zone Management Program. It is also in a Maritime Economy Reserve (MER) Zone under the proposed revisions in the Boston Zoning Code. Under the DPA and the MER zone designations, a recreational marina is not considered a compatible use. 2.68 APPENDIX C The project proponent should present the economic analysis that was done to make the decision to build a marina.

10.02 They should also identify other maritime industrial activities that would be appropriate for the site and a detailed explanation of why they were not part of the proposal. 4.2

10.03 2. In the DEIR, there is the discussion of the effects of wind and wakes on the proposed marina. The marina will occasionally be subject to strong waves from the east and the outer portion will be subject to the prevailing westerly winds. In addition, as the DEIR states there is much boat traffic between the main shipping channel and the proposed marina. There will also be the boats coming into the shipyard for service. The potential for sizeable wakes is great. We feel that the DEIR does not take into account current vessel types, sizes, and the amount of recreational as well as commercial activity which might have an effect on the proposed marina and the effectiveness of the breakwater. These issues address not only navigation and the commercial importance of the Port, but also the question of safety. 3.6 & 5.3

Traffic

10.04 1. No where in the DEIR is there mention of truck traffic to and from the site. A discussion of volumes, types, and routes for both construction and long-term truck traffic should be included in the FEIR. 6.4.6

10.05 2. It appears from the table on page 6-77 that the level of service by the end of Phase II drops significantly at 5 out of the 7 intersections identified as effected, yet there is little discussion of effective mitigation measures. There should be more effort directed toward a better mitigation plan for the project. 6.4.4 & 7.5

10.06 3. Assumptions about parking are not very clear. Only 45 spaces are scheduled for the 14[illegible] slip marina. It is proposed in the DEIP that there will be sharing of parking. However, what contingency plans are there if all the uses are occurring simultaneously. The parking plan for the project's various uses needs to be better delineated. 6.4.5

10.07 In addition, the assumptions that lead to the development of the parking plan should be clearly stated, especially related to the possibility of sharing spaces. 6.4.

Public Access

10.08 1. There is very little public access provided at the site. We 6.5 realize that with the industrial uses there will need to be some creative planning to match the goal of public access and safety. Perhaps there could be observation areas, guided tours and protected pedestrian walkways.

Conclusion

In summary, we support the maritime industrial uses currently in effect on the site, however, we have reservations about the recreational uses planned. The problem inherent in this proposal is that it reflects the recurring conflict between maritime industrial and maritime recreational uses which are manifested in the issues of public safety and the preservation of ideal maritime industrial land.

Sincerely,

Denise K. Breiteneicher

Denise K. Breiteneicher
Environment Department

N/S

MEPA

Boston

Raymond L. Flynn, Mayor

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SEP 28 1987

OFFICE OF THE SECRETARY OF
ENVIRONMENTAL AFFAIRS

RECEIVED

SEP 25 1987

OFFICE OF THE SECRETARY
OF ENVIRONMENTAL AFFAIRS

24 September 1987

Secretary James S. Hoyte
Executive Office of Environmental Affairs
100 Cambridge Street
Boston, Massachusetts 02202

Dear Secretary Hoyte:

The Boston Transportation Department is pleased to submit the following comments on the Draft Environmental Impact Report for Boston Marine Works (EOEA #6407).

The proposed rehabilitation of the East Boston Shipyard site for marine-related industrial uses restores a much-needed ship repair function to Boston Harbor. The project lies within the City's proposed Marine Economy Reserve (MER) zone and thus is consistent with city goals to establish marine-related industry at appropriate locations within the harbor. We do have questions about including a recreational marina and a restaurant on an industrial site, however, especially since these non-industrial uses contribute significantly to the traffic impacts of the project.

Our specific comments about traffic and parking issues follow.

Traffic impacts

11.01 Although the proponent concludes that the project will not have significant traffic impacts, the data presented suggest otherwise. 6.4
The transportation analysis indicates that developing both phases of this project will have adverse impacts on a number of intersections in East Boston (Table 6.4-8). While most intersections remain at Level of Service (LOS) C or better during Phase 1, adding Phase 2 traffic 6.4.4
degrades five intersections to LOS D or worse during the p.m. peak. These intersections are: Chelsea at Porter, Bremen at Porter, Maverick at Maverick Square, Maverick at Orleans, and Sumner at Orleans.

The analysis indicates that Phase 2 development represents 80 percent of the vehicular trip generation during the p.m. peak. The marina and restaurant together contribute nearly half of the average daily traffic associated with the project; heavy industrial uses, in contrast, generate only five percent of total project traffic.

Richard A. Dimino, Commissioner, Transportation Department
City of Boston/City Hall Square/Boston, MA 02201

Truck traffic

11.02 The draft EIR does not analyze the impacts of truck traffic at this industrial/commercial site. This is a serious omission, and the final EIR should evaluate the impacts of truck traffic on the surrounding neighborhood during construction and occupancy. This analysis should include projected truck volumes, types, schedules, and routes. 6.4.6

Parking

11.03 The draft EIR asserts that the 265 on-site parking spaces will meet the needs of the project. The final EIR should demonstrate the adequacy of this supply by identifying the demand associated with each user group. These should include shipyard workers, office workers, marina users, and restaurant patrons. 6.4.5

The draft indicates that different user groups can share the parking supply because of schedule differences. For example, marina users will be able to park in the office spaces during evenings and weekends. The proponents should address this issue in more detail and cleary identify the total demand for parking (broken down by user group) at key times of day.

Transit availability

11.04 The Boston Marine Works site is not located within convenient walking distance of Maverick Station on the MBTA Blue Line, especially during inclement weather. The proponents should continue their efforts to provide better connections between this site and other parts of East Boston. 7.5

Summary

Restoring marine-related industrial uses to the East Boston waterfront will help revitalize Boston Harbor. However, the proposed uses at the Boston Marine Works site do have significant impacts on traffic and parking for the East Boston neighborhood, and the final EIR should address these issues.

Thank you for this opportunity to comment.

Sincerely,

Richard A. Dimino
Commissioner

9641T
RAD/SB

the boston harbor associates
for a clean, alive and accessible Boston Harbor

51 Sleeper St.
Boston, MA 02210
Telephone (617) 330-1134

12.0

September 25, 1987

James S. Hoyte, Secretary
Executive Office of Environmental Affairs
100 Cambridge Street
Boston, Massachusetts 02202

Ref: Boston Marine Works
(Cashman Marine Enterprises) EOEA
No. 6407

Dear Secretary Hoyte:

The Draft Environmental Impact Report on The Boston Marine Works in East Boston, which is dated August 15, 1987, has been carefully reviewed by The Boston Harbor Associates. TBHA is a broadly supported membership organization dedicated to achieving balanced use of Boston Harbor.

In a letter dated February 11, 1987, to Mr. Steven Davis of your office, TBHA recommended that this project not be required to prepare an Environmental Impact Statement. In addition, full support was expressed for the plans to continue using this facility for water dependent purposes. Your decision to issue a waver of the Environmental Impact Report (EIR) on the rehabilitation of existing buildings, piers, and the graving dock was, therefore, favorably received.

Your waver was conditioned upon the preparation of a comprehensive EIR on the entire project before proceeding with the second, or marina, phase. You requested that the scope of the EIR include among other things:

* An assessment of expansion of the ship yard as an alternative to a marina in Phase II.

* Identification of "those areas of the site which might be open to various degrees of public access and how to balance issues of safety."

The material presented in the Draft EIR on these two subjects should be amplified before a determination on this project is

made by your office.

Expansion of the Shipyard. 3.6 &

12.01 This project is in a designated port area (DPA). Massachusetts Coastal Zone Management (MCZM) Program Policy 7 seeks to ensure that, in DPAs, "uses dependent on access to navigable channels are recognized and not impaired". The Boston Harbor Associates believes that marinas do not automatically qualify as a Designated Port Area use. The DPA concept was established to assure that commercial maritime activity and its "special physical and operational requirements" was preserved. Neither the Federal Channel, nor the depths around the piers, nor the heavy pier structure, nor the crane equipment are required for a marina. 6.1.1

12.02 The alternative of using the entire site for ship repair is treated briefly on pages 4-4 and 4-5. The applicant should be required to amplify that section to include: 4.2

1. A full inventory of the types and numbers of commercial vessels that are in the harbor or visit the harbor and thus might provide work for a ship yard. These would include not only ocean going ships but ferries, excursion vessels, tugs, barges, fishing and government vessels.

2. Recreational boating is growing in the harbor. These boats will also require shipyard services. The potential of this market should be quantified.

3. A marketing analysis should be made to determine the factors which cause vessels homeported in Boston to use shipyards as far south as Norfolk rather than local yards. The potential for shipyard work in Boston can not be projected without an understanding of why Boston has not always retained its "natural" business.

With the above data, the MCZM Office will be better able to assess whether the total project is in compliance with the spirit of Policy 7.

12.03 TBHA believes that a non-commercial, but water related, use such as a marina should be permitted only after the MCZM Office determines that no commercial, maritime need for the site exists now or in the near future. Such exceptions should be granted grudgingly and be subject to periodic reevaluation and retraction. 4.2

From discussions with the applicant's staff, indications are that the necessary information on commercial and recreational vessels, the repair

business potential for Boston and the space needed at this yard has been gathered even though it is not discussed in detail in the draft EIR. They are confident that this information can be presented and will thoroughly justify the temporary inclusion of a marina in this project.

Public Access.

TBHA has long been a strong supporter of public access to Boston Harbor's waterfront. The organization recognizes, however, the difficulties in providing continuous paths, amenities and park surroundings in an industrial maritime area.

In this project, the opportunities for providing public access to the shipyard portion of the project are certainly limited. The public can not be allowed to roam around the yard and even designated routes or organized tours would probably be impractical on a permanent basis.

A viewing platform that was readily accessible and overlooked the 3.6
12.04 graving dock could serve a useful educational purpose for the public and &
for school groups. The roof of Building #7, the electricians building, might
serve such a purpose. The applicant and the appropriate public agencies 6.5
might wish to work together on such a feature.

A different standard should apply to the marina portion of this pro- 6.1.5
12.05 ject should that part be permitted. The ability of the general public to
reach and enjoy the waterfront should be provided. Although public 6.1.6
access in the marina area is mentioned repeatedly in the Draft EIR, few
details are provided. The following questions require answers: 6.5

1. Will the general public have access to the same areas as do persons renting space at the marina?

2. If so, how will the property of the boat owners be protected?

3. Will the general public have access day and night?

4. If the general public will be allowed through the front gate unchallenged, what is the purpose of placing a guard there?

5. What amenities (lighting, benches, shade, toilets, etc.) will be available to the general public to make the quality of the access inviting?

Once answers to questions such as these are provided, the adequacy of public access in this project can be better evaluated.

Wake Protection.

The applicant has obtained consulting engineering advice on the wake and wave threat to the proposed marina and the necessary barrier needed to protect boats in the marina. Special attention to this matter is highly appropriate given the safety problems of poorly protected marinas. Commercial vessels, from water taxies to tankers, must have enough speed to maintain steerage and stay on schedule. Those marinas that must post "No Wake" signs to protect the boats inside pose a threat to the economics of vessels that must pass by.

The applicant has been advised that the data on vessels in Table IV, Appendix A, is outdated. For example, the lengths used for both Coast Guard cutters and tugs are about half the size of modern day vessels. In addition, many ferry services are using crew boats of the type found in the Gulf of Mexico for servicing oil rigs. These fast, high powered boats create sizeable wakes but are not considered.

12.06 TBHA recommends that on-site measurements of wake from various 3.6
passing vessels under several wind conditions be obtained. Although the &
design of wake protection devices is still as much an art as a science, the
size wake that can be expected should not be underestimated. 5.3

Leases on Marina Slips.

Some additional insight into the applicant's plans could be gained if APPEN
the applicant were asked to provide a sample of the rental agreement to be
12.07 used for leasing slips in the marina. For example, what are the provisions D
for renewal, especially towards the end of the 25 year period? What access
procedures and responsibilities are mentioned? What facilities are to be
provided. Can the applicant be held liable for wake damage due to inadequate protective devices?

Conclusion.

This project has merit. It is intended to provide a competitive shipyard environment in Boston Harbor. It envisions the continuation of shipyard activity on a site that has been used for that purpose for many years. It will provide employment for workers with a broad range of skills. It leaves options available to respond to future trends in the maritime industry.

The project will also set precedents for future proposals in designated port areas and will be viewed from the perspective of Chapter 91 provisions.

With more details from the applicant on (1) the justification for not using the entire area for a shipyard, (2) the access provided the general public, (3) the adequacy of the wake barrier, and (4) the marina rental

agreements, approval of this proposal seems within reach.

The applicant has established an aggressive timetable for moving though the permitting process this winter. He hopes to begin construction by next April. Although the matters raised in this letter are of importance to this project and the future of the harbor, resolution of them need not seriously delay the process. Your efforts to move expeditiously will be appreciated by the applicant and the public.

Yours truly,

Daniel B. Curll, III
President

DBC:pc

cc: George Macomber, Chairman

8.2 Supporting Comments on the Draft EIR

Copies of comment letters in support of the Boston Marine Works project which do not require a response are included in Section 8.2 of this Final EIR. We gratefully acknowledge the on-going support of these groups for the shipyard and the proposed reuse, renovation, and rehabilitation of these facilities.

COMMENT LETTER NO. 13.0

BOSTON BARGE AND TUGBOAT COMPANY, INC.
MARINE TRANSPORTATION
256 MARGINAL STREET • EAST BOSTON, MASSACHUSETTS 02128
(617) 569-5151

NTO

RECEIVED
SEP 18 1987
OFFICE OF THE SECRETARY OF
ENVIRONMENTAL AFFAIRS

September 17, 1987

Mr. James S. Hoyte, Secretary
Executive Ofice of Environmental Affairs
Leverett Saltonstall Building, Room 2000
100 Cambridge Street
Boston, MA 02202
Atention: MEPA Unit

Dear Secretary Hoyte,

I am writing to express my support for the the Boston Marine Works project. As President of Boston Barge and Tugboat, I am always concerned with projects that could be detrimental to the operations of my business on the Harbor. The proposed marina will not have any affect on my operations at all. Since there is an abundance of deep water access available in the Port of Boston, I do not see the marina as having any impact at all on the availablity of deep water access in the harbor. In fact, I see the marina as being a good interim use to insure that we preserve this deep water access in the event it is needed. However, I don't see that need developing over the next 20 years.

The Graving Dock service for mid size ship repair is extremely important to Boston Barge and Tugboat and others who need such services. It is convenient and minimizes our down time. I am pleased to see it in operation again.

Sincerely,

Brendan Lally
President
Boston Barge and Tugboat Company

COMMENT LETTER NO. 14.0

NB

Woods Hole, Martha's Vineyard and Nantucket Steamship Authority

P.O. Box 284, Woods Hole, Mass. 02543

(617) 548-5011

RECEIVED

SEP 25 1987

OFFICE OF THE SECRETARY OF ENVIRONMENTAL AFFAIRS

September 21, 1987

James S. Hoyte, Secretary
Executive Office of Environmental Affairs
100 Cambridge Street
Boston, Massachusetts 02202
Att: M.E.P.A. Unit

Dear Secretary Hoyte:

I am writing to voice my support for the Boston Marine Works. As General Manager of the Steamship Authority, I am concerned that Boston Harbor will continue to offer the capability of drydocking vessels of the size we operate, thereby keeping maintenance dollars in Boston. As more and more shipyards with drydocking capability go out of business, I am forced to do more ship repair work outside Massachusetts.

While the proposed marina will not of itself directly assist us, I feel that its operation is mandatory if Cashman Marine Enterprises is to have any chance in remaining a viable ship repair source. I say this because of the current sad state of affairs of our American flag marine industry.

It would be a definite plus to all of us remaining in the New England marine industry to have the facilities, including recreational marina, present at the Boston Marine Works Project. Such usage, industrial and recreational, would be a plus to all who use our waters.

Sincerely,

R. G. Eastman

R. G. Eastman
General Manager

RGE:mh

COMMENT LETTER NO. 15.0

NB

EASTERN TOWBOAT CORPORATION

- COASTAL TOWING
- STEEL BARGES
- TUG SERVICES

Douglas J. Della Porta
President

9 River Avenue, Revere, Massachusetts 02151
Office & Dock: 617 567-5299
Residence: 617 289-1321

22 September 1987

RECEIVED
SEP 25 1987
OFFICE OF THE SECRETARY OF ENVIRONMENTAL AFFAIRS

The Secretary
Executive Office of Environmental Affairs
100 Cambridge Street
20th Floor
Boston, MA

Dear Sir,

I am aware of the Boston Marine Works Project proposal which Cashman Marine Enterprises, Inc. has put forth to your office.

We here at Eastern Towboat, Corp. are supportive of the proposal as presented. We see no problem with the shipyard Pier 1 being used for a marina and other light industrial uses, where as Cashman Marine Enterprises, Inc. intends to keep the shipyard operating in a maritime fashion.

It is also in our best interest, and in our opinion, the best interest of the maritime industry in Boston that the graving dock located at the shipyard be kept open for ship repairs. Cashman Marine Enterprises has stated in their proposal they intend to keep the graving dock open for just such a purpose.

To summerize we are supporting the project as we understand it and as outlined above.

Sincerely,

Douglas J. Della Porta
Douglas J. Della Porta
President

DJDP/nbb

COMMENT LETTER NO.16.0

NB

Tugs, Barges
and Jack-ups

HORSEPOWER IN THE PILOTHOUSE

(where it counts)

FOURNIER MARINE CORPORATION
Pier 50 • Box 301
Charlestown, Massachusetts 02129

(207) 338-3000
(617) 242-1993

RECEIVED
SEP 22 1987
OFFICE OF THE SECRETARY OF
ENVIRONMENTAL AFFAIRS

September 18, 1987

Secretary, Executive Office of
Environmental Affairs
ATTN: Mepa Unit (EOEA No. 6407)
Levrett Saltonseall Building
100 Cambridge Street - 20th Floor
Boston, MA 02202

RE: Boston Marine Works

Dear Sir:

I am writing this letter in support of Cashman Marine's plans for the redevelopment of the former Bethleham Steel Shipyard in East Boston. We see the development as a needed improvement to the waterfront in the area. We see the mixed uses of office, marine, industrial, and recreational operate very well at this site and complement each other.

Unfortunately, the development of the shipping industry in Boston has caused many of the harbor piers to fall into disrepair. It is good to see plans like this to utilize waterfront space for marine uses. Environmentally, we see this project as a help to clear up a former heavily industrial area that has been abandoned.

After carefully reviewing the Environmental Impact Report, I feel we can confidentially offer support for the Boston Marine Works Project.

Sincerely,

FOURNIER MARINE CORPORATION

Capt. Arthur J. Fournier
President

COMMENT LETTER NO. 17.0

NB

MBL Massachusetts Bay Lines, Inc.
183 Whiting St. Suite 1, Hingham, Ma. 02043

ROWES WHARF, BOSTON • STATE PIER, HINGHAM • PIER 11, CHARLESTOWN NAVY YARD

RECEIVED
SEP 25 1987
OFFICE OF THE SECRETARY OF ENVIRONMENTAL AFFAIRS

September 23, 1987

James J. Hoyte, Secretary
Executive Office of Environmental Affairs
100 Cambridge Street
Boston, MA 02202

Attn: MEPA Unit
Re: Boston Marine Works Environmental Impact Report

Dear Secretary Hoyte,

I am sending this letter in support of the Boston Marine Works project being developed by Cashman Marine Enterprises in East Boston. As someone who is active in the commuter and excursion boat industry, I feel it is critical that adequate ship repair facilities exist within Boston Harbor in order to minimize "down time" for my vessels. During the past few months, two of our vessels have been serviced by Boston Graving Dock Corp. at the Marine Works. Their quick service has allowed me to maintain the busy schedule I have for my vessels.

While I'm primarily concerned with the repair functions to be offered at the Boston Marine Works, I support their overall concept to provide a multi-use marine center for commercial, industrial and recreational vessels, since this diversification should allow them to stay competitive in the difficult ship repair business.

Sincerely,

William J. Spence

William J. Spence
President

WJS/ka

COMMENT LETTER NO. 18.0

UB

new england fisheries development foundation, inc.

September 24, 1987

James S. Hoyte, Secretary
Executive Office of Environmental Affairs
100 Cambridge Street
Boston, MA 02202

Attention: M.E.P.A. Unit

SUBJECT: <u>Cashman Marine Enterprises - "Boston Marine Works" Proposed Development in East Boston</u>

Dear Mr. Secretary:

The Foundation and its members strongly support the subject project. We urge you to weigh carefully the advantages of a healthy marine and fishing industry, of a working waterfront, and the impact of an active harbor on the vitality and character of the port of Boston.

Although it is impossible to compete with "high tech" as a major portion of the Commonwealth's economy, we do have longevity and consistency on our side of the equation. As far as tourism is concerned, what is and has been one of the major industries of the Northeast? How many people come to Boston and New England for a lobster and a look at some fishing boats? And what about the Cod on top of the State House?

Let's make an all out effort to keep Boston's uniqueness in tact and allocate remaining parcels on the Harbor for maritime related uses, such as the "Boston Marine Works."

Thank you for your consideration and attention to this project.

Sincerely,

KC

Kenelm W. Coons, Executive Director

COMMENT LETTER NO. 19.0

11B

RECEIVED
SEP 24 1987
OFFICE OF THE SECRETARY OF ENVIRONMENTAL AFFAIRS

Bay State Towing Company, Inc.

RECEIVED
SEP 24 1987
OFFICE OF THE SECRETARY OF ENVIRONMENTAL AFFAIRS

Mr. Russell Tripp
Owner & President
Baystate Towing, Inc.
E. Boston Pier 1
End of Bremen St.
East Boston, MA 02128

Mr. James S. Hoyte
Executive Office of Environmental Affairs
100 Cambridge Street
Room 2000
Boston, MA 02202
Attn: MEPA Unit

Re: Boston Marine Works

Dear Secretary Hoyte,

I am writing this letter in support of the Boston Marine Works project at the former Bethlehem Steel yard in East Boston. Occupying space just down the street from the project, the shipyard has always been an area of iterest to me. As owner and President of Baystate Towing, I find it important to keep up with waterfront development that could affect my business as well as that of operators within the Harbor.

I am in favor of keeping the Marine Works as has been layed out in their Draft Environmental Impact Report. The maritime uses of the ship repair operations and of the marina I feel will complement each other as well as significantly improve an area that has been neglected for quite a few years. The graving dock operation is a much needed asset to the boating community in the harbor. It will be an aide to us for repairing our vessels which before could not be serviced in the immediate area.

Sincerely,

Russell Tripp

Russell Tripp
Owner & President
Baystate Towing

COMMENT LETTER NO. 20.0

NB

PURITY Brand FILLETS

PURITAN Fish Co.

WHOLESALE FISH DEALERS

21 Fish Pier Boston, Mass. 02210

September 23, 1987

James S. Hoyte, Secretary
Executive Office of Environmental Affairs
100 Cambridge, St.
Boston, MA. 02202

RECEIVED

SEP 29 1987

OFFICE OF THE SECRETARY OF
ENVIRONMENTAL AFFAIRS

Attn: M.E. P.A. unit

Dear Mr. Secretary:

As president of Puritan FIsh Co., Inc. I am pleased to learn that Cashman Marine Enterprises is proposing to locate a Marine Industrial/Recreational facility in East Boston, MA. The fishing industry desperately needs all the support facilities available for boat repair, dockage, etc. We have had occasions when our fishing boats had to venture to other ports for repair services.

It is projects like this that will return Boston to the thriving port it once was.

Sincerely,

Michael S. Vitale
President

APPENDIX

APPENDIX A

DRAFT EIR AND ENF DECISIONS

The Commonwealth of Massachusetts
Executive Office of Environmental Affairs
100 Cambridge Street
Boston, Massachusetts 02202

MICHAEL S. DUKAKIS
GOVERNOR

JAMES S. HOYTE
SECRETARY

October 2, 1987

CERTIFICATE OF THE SECRETARY OF ENVIRONMENTAL AFFAIRS
ON THE
DRAFT ENVIRONMENTAL IMPACT REPORT

PROJECT NAME	:	Boston Marine Works
PROJECT LOCATION	:	East Boston
EOEA NUMBER	:	6407
PROJECT PROPONENT	:	J.M. Cashman Marine
DATE NOTICED IN MONITOR	:	August 26, 1987

The Secretary of Environmental Affairs herein issues a statement that the Draft Environmental Impact Report submitted on the above project adequately and properly complies with the Massachusetts Environmental Policy Act (G.L., c.30, s.61-62H) and with its implementing regulations (301 CMR 11.00).

Overview

Generally, the Draft EIR has taken a "broad brush" approach to the issues. This has been shown to be unsatisfactory by the number of thoughtful comments received. In the main, the report itself has been censored, and not the merits of the project. The Final EIR will, therefore, have to be of highest quality in order to overcome the serious limitations identified in this Certificate and in the public comments.

The sections of the report dealing with maritime interests have overlooked the scope requirement for an assessment of the shipyard expansion as an alternative to the program proposed for Phase II. The Draft report's arguments that such a plan is infeasible are largely unsubstantiated, and those arguments have been countered in a number of comments received.

The question whether the site can sustain commercial maritime activity, without the recreational marina component is of major consequence, since the site is in a Designated Port Area. Such a mixed use project is an exception to policy, and therefore should be held up to the highest scrutiny.

The comment received from the Boston Harbor Associates regarding the potential for the expansion of the shipyard is especially thoughtful, and it should provide some clear guidance for further analysis in the FEIR.

The Final report will be expected to address the comments dealing with C.91 issues, Harborpark, and Maritime Economy Reserve Zones (MER). Based on the comment from Massport, there could be a misunderstanding with respect to the jurisdiction covering those topics. Because of the lease of Commonwealth lands, I have unlimited jurisdiction here, over environmental issues, irrespective of the city and state permit requirements for the project. Given that the jurisdiction question has been raised by Massport, it would be useful to include a clarification of any city and state permit exemptions that might be enjoyed by Massport. Does the lease convey these exemptions to the proponent?

Traffic

The 1990, No Build alternative should have included the projected traffic from the Lobster Pier and public park project (EOEA #5671), as well as the the traffic from Clippership Wharf (EOEA #5866). Both projects have previously filed with the MEPA Unit, and should have been considered in the analysis.

This is an egregious error, since MEPA policy regarding previous filings is well known. Furthermore, the scope specifically called for the East Boston pier projects to be included in the traffic analysis.

It is not at all clear why the combined Phase I and Phase II traffic impacts were not evaluated. Nowhere in the report are the traffic impacts of the entire project presented. Tables 6.4-6 and 6.4-8 show the levels of service (LOS) at key intersections for each phase. These two tables should be combined to show the levels of service in 1990, Full Build.

Even without considering the entire project, the traffic study shows a deterioration in traffic operations at Maverick Square and the intersection of Orleans/Sumner which relates to the project. Maverick Square will operate at LOS E (AM peak) and LOS F (PM peak), and Sumner Street will operate at LOS E in the PM.

General Mitigation Factors

This section of the report must be completely redone. It's apparent that very little thought and attention has been given to

traffic reduction. For example, it has been noted by several commenters that truck traffic has been totally ignored.

Furthermore, the discussions are shallow, unsupported by analysis, and of questionable merit. Whereas this porponent has not made any commitment to tangible mitigation for traffic problems in East Boston, there is a clear responsibility to demonstrate that the traffic reduction factors will be effective in reducing the traffic impacts from the project to an insignificant level.

No such demonstration has been made at this DEIR review stage. Therefore, the proponent is cautioned that such a showing must be made, or tangible mitigation should be proposed in order that the Final report be deemed adequate.

Water Transportation

There is insufficient detail regarding the potential use of water transportation as a replacement for automobile use. Where on site will water taxis berth? The Draft EIR (6.7.4.1) indicates that arrangements will be made to have existing water transport services stop at the property. What opportunities exist to reroute available water transportation, such as the shutttle to Logan, via this site? How would a detour to this site affect the water transit ridership, especially from Logan, where commuting to downtown is time-sensitive?

How extensive a water transport service could the project support? To what extent would use of water taxis relieve traffic impacts on East Boston Streets?

The report is also vague with respect to the proposed launch service from downtown to the marina. Such incomplete plans are indicative that water transportation has been given a low priority. The utility and effectiveness of this alternate transport mode has yet to be demonstrated.

Off Peak Transit

The Draft EIR indicates that marine industrial traffic ends before 6:00 PM. When does the traffic commence the evening exodus from the site? If traffic exists during the 4:00 to 6:00 PM period, it will have an effect on traffic congestion and shouldn't be considered an" offset".

Parking Sufficiency

The report has not demonstrated that on site parking is sufficient. Parking demand from the project components has not

been quantified. Neither has an analysis been provided to show that parking turn over by different user groups will not conflict for the limited on site parking spaces.

According to the DEIR, a shuttle service will be provided to the Blue Line, "(w)hen activities on site grow to the point when the number of people warrant such service." This open ended commitment is as good as no commitment at all. What number of people would warrant a shuttle? At what point in the project development can it be predicted that a shuttle would be necessary? In the absence of the shuttle, shouldn't the walking distance (more than 1/2 mile) be considered too lengthy to consider the MBTA Blue Line a viable alternative to automobile use?

The EIR should have considered other options to enhance mass transit use, such as employee subsidies as an incentive.

Particular attention should also be given to the Jeffries Point comment which has made the observation that the potential use of bus transit by the project is hampered somewhat by the lack of maintenance on the "Golden Stairs" which lead from the Golden Stairs Park to Marginal Street.

Plans showing the onsite parking, and automobile and truck circulation, offloading, and service areas should have been presented. Previous users accomodated parking overflows on site. How will this be accomplished, or will excess parking compete with other uses on neighboring streets? The FEIR should provide a more complete assessment of the parking situation, including a discussion of weekday and weekend, short and long term parking rotations, which were identified in the report.

C.91, Tidelands

The report's presentation of documentation and discussion of the historic high water line is incomplete, particularly since the report acknowledges that the high water line has been relocated landward from the mapped historic high water line in the DEQE files.

Figure 6.1-1 requires further explanation. Areas shown within the low water line along piers 1 and 2 have not been shaded. Are these areas considered private or commonwealth tidelands? Commonwealth tidelands should be clearly identified on the plan.

Marine-Related Issues

Only cursory attention has been given to the potential for conflicts between commercial and recreational boating. This issue is a key concern with respect to the acceptability of a mixed use maritime development in a designated port area.

The Boston Shipping Association comment has seriously challenged the Draft EIR's conclusion that "(n)o conflicts are expected to occur". Absent a clear showing that conflicts will not occur, the FEIR must make a serious effort to analyze the impacts of increasing recreational boating on port operations.

Likewise, the issue of wake protection for the recreational marina has not been adequately assessed. The Boston Harbor Associates recommendation that on-site measurements be taken of the wake effects, from a representative fleet, during a range of wind conditions should be pursued in the FEIR.

Hazardous Material Handling

The report has not specifically identified or quantified the volumes of hazardous products that will be handled on an average month or annually. What percentage of that material will ultimately be handled as hazardous waste, which would require off site disposal?

A number of commenters are concerned about the fuel truck movements on site. These concerns should be addressed.

To the extent possible, a draft of the Hazardous Materials management plan should be included in the FEIR. The level of detail presented in the draft is too general to ascertain the adequacy of the proposed hazardous materials handling practices.

Sewer

An analysis of peak, wet weather flows to the sewerage system should have been presented in addition to the dry flows, and impacts should be discussed.

According to the facilities plan the projected peak dry weather flow is expected to decrease through the year 2025, even with proposed development. This projection should be explained in greater detail.

The Draft EIR has not incorporated any of the proposed developments, e.g. Clippership Wharf and the Lobster Pier in the sewer capacity analysis. These projected flows should become background for the future, No Build sewer capacity computations.

Even without these projects, Table 6.3-3 shows a projected capacity deficiency in the 24 inch sewer in Bremen Street. This impact is considered to be insignificant without explanation or recommendation for improvement.

The Draft report has stated that the combined sewer overflow treatment facilities will be constructed, perhaps as early as 1988 to address a significant Boston Harbor water quality problem. The report appears to be overly optimistic, given the Massachusetts Water Resources(MWRA) comment,

> "The propose CSO facilities in East Boston near the project site may never be constructed, at least in their present configuration."

In light of this comment, the project's drainage impacts, both quality and quantity, on the CSO and Boston Harbor must be reconsidered. Alternative mitigation should be proposed for the project's drainage, based on the assumption that treatment facilities will not be available in the area.

The Draft EIR should have made a specific commitment to pump out facilities for marina users. What volumes will be generated over a boating season?

Public Access

There appears to be an interest in providing public access to the site, but minimal detail of the access plan has been provided. Obviously, the recreational marina and piers is an area where public access would be inviting, however, it is less obvious how access will be treated in the maritime industrial areas of the site. The connection between public access from the East Boston Piers 1 through 5 and this site is also of interest.

Amenities proposed and access paths to and across the site should be shown on detailed site plans. Featured visitor attractions and important views should also be identified. Opportunities for transient boat dockage should be considered to promote waterside public access.

October 2, 1987
DATE

JAMES S. HOYTE, SECRETARY

Comments received:

9/17/87	Boston Barge and Tugboat Company, Inc.
9/21/87	Steamship Authority
9/21/87	MAPC
9/22/87	Eastern Towboat Corp.
9/23/87	Mass. Bay Lines Inc.
9/24/87	New England Fisheries Development Foundation, Inc.
9/24/1987	Jeffries Point Harborside Neighborhood Association
9/24/87	Boston Shipping Association
9/24/87	Bay State Towing Company, Inc.
9/25/87	Massachusetts Water Resources Authority
9/25/87	MCZM
9/25/87	Boston Harbor Associates
9/24/87	Harborpark Advisory Committee
9/25/87	Environment Dept, City of Boston
9/25/87	MASSPORT
9/24/87	Boston Transportation Department
9/29/87	Puritan Fish Company
9/29/87	BRA
9/29/87	DEQE, Air Quality

JSH/NB/nb

The Commonwealth of Massachusetts
Executive Office of Environmental Affairs
100 Cambridge Street
Boston, Massachusetts 02202

MICHAEL S. DUKAKIS
GOVERNOR

JAMES S. HOYTE
SECRETARY

FINAL RECORD OF DECISION

PROJECT NAME : East Boston Shipyard

PROJECT LOCATION : Boston

EOEA NUMBER : 6407

PROJECT PROPONENT : Cashman Marine Enterprises, Inc.

DATE NOTICED IN MONITOR : January 23, 1987

I. PROJECT DESCRIPTION

Cashman Marine Enterprises proposes to rehabilitate several existing buildings and a graving dock for marine-related industrial use and to construct a 240-boat marina on the southwest section of the site. Office space would be expanded from about 30,000 s.f. existing to 60,000 s.f. in the future.

II. THE NEED FOR AN ENVIRONMENTAL IMPACT REPORT

The total project would entail and increase in marine and traffic activity in East Boston. Handling of hazardous industrial materials, issues of public access and implications for existing overtaxed sewer systems need to be addressed in a concise, imaginative and useful report. The lease of Massport land provides full subject matter jurisdiction for MEPA review.

III. THE WAIVER REQUEST

The proponent has requested a waiver from the requirement to prepare an EIR before proceeding with the Phase 1 rehabilitation of the site, pursuant to Section 301 CMR 11.18 (3) of the MEPA regulations.

V. CRITERIA FOR A WAIVER

The MEPA regulations (301 CMR 11.18) provide that a waiver to the regulations may be granted when strict compliance will lead to an undue hardship "and" will not serve to minimize or avoid damage to the environment. The initial phase must be severable and independent, with insignificant impacts. Massport will specify in their lease that no activity beyond Phase 1 shall proceed without full MEPA compliance.

VI. FINDINGS

Based on a review of the ENF, a site visit, and a scoping meeting in East Boston, I find that :

1. The rehabilitation of existing buildings and dock facilities are not individually of such significance as to warrant the preparation of an Environmental Impact Report.

2. The building and site rehabilitation activities of the project are severable and independent from the marina construction, provided that the emphasis is on maintaining the shipyard activities of the site.

3. The EIR should be able to provide useful information and mitigation relative to marina operations, handling of hazardous materials, and efforts to retain marine-related activities on the East Boston waterfront.

4. The requirement of hardship has been met by the demonstrated need of the proponent to begin immediate repairs on the leaking graving dock, and to secure and utilize other buildings on the site. These matters are covered in reasonable detail in the waiver request and hardship letter, dated January 14, 1987, from Briggs Engineering.

Therefore, I have decided to (1) allow the Phase 1 rehabilitation of existing buildings, piers and the graving dock to proceed, with its associated Massport lease, and (2) to condition such waiver upon the completion of an Environmental Impact Report described below covering the construction and operational consequences of both Phase 1 and Phase 2, with commitments for short-term and long-term mitigation.

VII. SCOPE OF THE EIR

MARINE-RELATED USES

Description of recent land and building uses, and proposed activities in the Shipyard area. Any activities which are not marine-related should be clearly identified. The proposed office element includes an expansion from approx. 30,000 s.f. existing to 60,000 s.f. in the future. In order to encourage maximum marine-related use, the target usage for the office space should be less than 10,000 s.f. of non-marine uses by the end of the second year and 30,000 s.f. for the third year and thereafter. If the proponent determines that more than 30,000 s.f. of non-marine-related office space is desirable as part of the plan, a letter of project change should be filed with MEPA, with consequent meetings and determination for possible rescoping or supplemental EIR.

The developer should discuss with Coastal Zone Management personnel the best methods to assure marine-related uses and to maintain consistency with the various CZM policies outlined in the February 17, 1987 memorandum of Richard Delaney, CZM director.

The alternative for Phase 2 should be assessed of either constructing a marina as proposed, or of expanded ship repair operations.

SEWER AND HAZARDOUS MATERIALS

The EIR should describe all anticipated operations involving hazardous materials such as sand-blasting and the use of anti-corrosives, wood preservatives, paints and solvents. The report should include a management plan to control all hazardous materials from release either into the marine environment, or the East Boston sewer system.

TRAFFIC

The report should estimate the amount of traffic generated from Phase 1 and 2 separately and in combination with other projects along the East Boston Piers which have already filed with MEPA. Routes and volumes of traffic to and from the tunnels should be indicated. The feasibility of the site for water taxi operations and van shuttles to Maverick station should be considered for traffic mitigation.

MARINA DESIGN AND PUBLIC ACCESS

The design issues raised by CZM should be discussed in detail. The report should identify those areas of the site which might be open to various degrees of public access and how to balance issues of safety. Special events such as Tall Ships programs should also be discussed.

March 30, 1987
DATE

JAMES S. HOYTE, SECRETARY

JSH/SHK/bk

APPENDIX B

ENVIRONMENTAL NOTIFICATION FORM (ENF)

SDM COPY

BRIGGS

400 Hingham Street, P. O. Box 369, Rockland, MA 02370-0369 ► (617) 871-6040

January 14, 1987

Steven C. Davis, Assistant Secretary
Environmental Impact Review
Executive Office of Environmental Affairs
MEPA Unit
100 Cambridge Street
Boston, MA. 02202

RE: "Phase I" Waiver Request, Proposed
Rehabilitation and Reactivation,
East Boston Shipyard Facilities

Dear Assistant Secretary Davis:

Enclosed is a completed ENF for reopening, rehabilitating and operating Massport's East Boston shipyard. This ENF is filed on behalf of Cashman Marine Enterprises, Inc. (the proponent), 800 Bridge Street, (P O. Box 75), North Weymouth, MA. who has been selected by Massport to lease, rehabilitate, and operate this existing marine industrial facility. It is our interpretation of the MEPA regulations that the proposed project does not automatically require the preparation of an Environmental Impact Report. Should it be determined that an EIR is required, we hereby request a waiver for the inital or "Phase 1" portion of the project as provided under Section 10.18 of the MEPA regulations. Phase 1 is the proposed rehabilitation and reactivation of the existing buildings, piers and 256' graving dry dock. Phase 2 is the design and construction of a 240 slip recreational marina. The background and justification for this waiver request are set forth below.

The East Boston shipyard site currently includes 11 buildings, 2 dry docks, gantry cranes, bridge cranes and 5 piers including one 1020 feet in length, and a second 875 feet in length, both with mean low water already dredged to 35 feet. These facilities were previously owned and operated by Boston Shipyard Corporation (BSC) and were purchased by Massport in December, 1985. During the peak of operation by BSC, 500± people were employed and the buildings were utilized for a mixture of purposes including office (16%±), industrial (53%±) and warehouse (19%±) uses. (Ref. Table 1, ENF) These facilities were used primarily in support of BSC's large scale ship repair operation, a maritime industrial use with associated impacts on the surrounding natural environmental and neighborhood.

Massport purchased the property to assure that its future use would be consistent with current state policy for urban, coastal waterfront sites such as that proposed (ie: for marine industrial, commercial and other related uses). The proponent was selected by Massport to lease the site and operate it in accordance with Massport objectives.

The proponent's proposal for the reuse of the East Boston shipyard facilities, as explained in the ENF, is composed of the following three general components (Ref. Figures 1 and 2, Tables 1 and 2, ENF):

A. Ship Repair and Marine Contracting Component

The proponent proposes to rehabilitate building 7 and utilize it and the surrounding yard area to:

1. Reopen, manage and operate the existing 256' graving dry dock for commercial ship repair.
2. Manage the operational component of the proponent's existing marine contracting company, now located in Weymouth.

These two operations will involve 12-15 of the proponent's employees on site, the storage and docking of some of the proponent's marine contracting equipment between jobs (eg; trucks, barges, cranes, scows and pile drivers) and ship repair activities including welding, sand-blasting and spray painting. The operation of the proponent's marine contracting equipment will occur primarily off-site , at job locations. Typically, the number and type of equipment stored at the site between jobs at any one time will be two barges, four pick-up trucks and two cranes.

The other buildings within this component (ie; buildings 3, 4, 5 and 6) will be rehabilitated and subleased by the proponent for a mix of industrial, commercial and office uses (Ref. Table 2).

B. Marina Component

A 240 slip recreational marina, with supporting parking, will be provided within this component of the proposed project. The slips will be designed around the 876' and 1020' piers. (Ref. Figure 2) These piers will be upgraded and maintained with income generated from the marina sales, service and operation. This will preserve Massport's option to return the piers to large scale ship repair use should market demand for such facilities return to Boston Harbor after expiration of Massport's lease with the project proponent in 25 years.

The marina operation will be partially or totally subleased by the proponent and the buildings within the area (ie; buildings 8, 9 and 10) will be rehabilitated and subleased for a mix of marina and non-marina office, industrial and commercial uses. (Ref. Table 2)

C. Office and Industrial Component

This component of the project, involving the smallest area of the three components, will result in the rehabilitation and subleasing of an existing office building and machine shop (buildings 1 and 2 respectively).

It is estimated that the rehabilitation, construction, leasing and operation of all three components will require 2-3 years to complete. First priority (ie; within the first 6 months) will be given to;

1) relocating the operational components of the proponent's existing marine contracting business to the site;

2) reactivating the existing 256' graving dry dock and ;

3) rehabilitating and leasing a minimum of 60,000 square feet of office and industrial space.

During this period the proponent anticipates short term transitional activities including;

1) docking commercial vessels along the 875' and 1020' piers while the marina is in the planning stages and;

2) utilizing building number 8 for vessel component and steel fabrication, vehicle maintenance, sand blasting, painting and storage, while the interior space of this building is redesigned for recreational boat sales, service, repair and storage.

First priority is given to these elements of the proposed project since they will generate the maximum revenue in the minimum time, thereby providing funds required in the near term to begin the remainder of the proposed rehabilitation.

The Phase I portion of the proposed project, for which a waiver is requested, is all of the project elements set forth above (wherever in the property these elements occur) except the proposed 240 slip recreational marina and associated boat sales, service storage and parking facilities.

The primary justification for the waiver request is that without the marina, the proposed reactivation of these buildings for the purposes proposed will be a continuation of activities similar to those which have occured on the site in the recent past, but smaller in scale and with less impacts. The operation of the 256' graving dry dock will result in substantially less welding, sand blasting, spray painting and early morning, evening and weekend work than occurred when BSC operated the shipyard. This is because BSC operated this dry dock in conjunction with two other larger dry docks, one 479' in length and the other 622' in length.

Additionally, there will be a maximum of 300 employees at the site during full operation compared to the 500 employees during the peak of BSC's operation of the shipyard. This is because many of the users of the industrial space wil be contractors like the proponent who will work primarily off site. Even with the marina in operation, peak use will be substantially less because marina users will be on the site primarily during evenings and weekends.

Assuming the proposed shift in the use of the buildings (Ref. Tables 1 and 2, ENF) and a maximum of 300 employees, average daily trips (ADT) is projected to be 1020, which is a reduction 43% from that calculated for BSC during peak operation. (Ref. Tables 3 and 4)

A second justification for requesting the waiver is that the fundamental public purpose for Massport's acquisition of the shipyard is to insure the continuation of ship repair capacity within Boston Harbor. The need for local ship repair facilities is necessary with the increasing demand for water transportation. This is occuring while the supply of these facilities is diminishing due to a regional downward trend in the large scale ship repair industry. Reopening and operating the 256' graving dock and associated supporting facilities will provide readily available repair facilities for the 26 Boston Harbor commutor vessels which now go as far as Norfolk, Virginia for service.

Requiring that this be posponed until after the MEPA review process will serve to further delay the reintroduction of this important service to Boston Harbor without any resulting gain to the public.

A third justification is that the eleven buildings and 5 piers on the site have already deteriorated due to the lack of use and improvement during the year since BSC ceased operatons. Further delay in rehabilitating and reusing these structures will result in further damage and increased repair costs.

Fourth, over 50% of the proposed rehabilitation and subleasing of the existing facilities will occur after the first year of reopening of the site, well after the completion of an Environmental Impact Report. This will leave substantial opportunities during the EIR process to identify changes in the operation of these buildings which may mitigate environmental impacts.

Finally, as long as these facilities are not reactivated, Massport is losing significant income. The sooner they are rehabilitated and subleased, the sooner Massport will begin to receive revenues to offset its $11,000,000 investment in the shipyard.

In summary, allowing the Phase I work to proceed during the EIR process, should an EIR be required, will result in substantially less environmental impacts than those which occured during the previous operation of the shipyard by BSC. Additionally, it will not foreclose options to identify mitigating measures. Not allowing the Phase I work to proceed will result in a continued short fall in ship repair capacity within Boston Harbor, continued deterioration of the existing facilities and a continued loss of return on investment to Massport from this facility.

We will be pleased to provide any additional information required by you or your staff regarding this request.

Very truly yours,

Roderick Gaskell, Director
Land Use Permitting Services

RG.m

enclosure

APPENDIX A
COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS

ENVIRONMENTAL NOTIFICATION FORM

I. SUMMARY

A. Project Identification

1. Project Name East Boston Shipyard

2. Project Proponent Cashman Marine Enterprises, Inc.
   Address 800 Bridge Street, P.O. Box 75
   North Weymouth, MA 02191-0075

B. Project Description: (City/Town(s) East Boston, Massachusetts

1. Location within city/town or street address 256 Marginal Street
   East Boston, Massachusetts

2. Est. Commencement Date: 1 month (Phase 1) Est. Completion Date: January 1989
   Approx. Cost $ 3,000,000 Current Status of Project Design: 25 % Complete

C. Narrative Summary of Project
Describe project and give a description of the general project boundaries and the present use of the project area. (If necessary, use back of this page to complete summary).

The proposed project is the reuse of the existing buildings, cranes, piers, and surrounding open yard area of the East Boston Shipyard site. (Ref. Figure 1. Existing Buildings) The existing facilities will be rehabilitated and used for marine-related industrial, commercial ar office uses, to the extent that there is market demand for such uses. No signigicant new construction is proposed and no filing or dredging of coastal wetland or tideland resources is proposed. The site will be divided into the following three general components: (Ref. Figure 2

A. An area that will be utilized primarly for ship repair and as a storage, staging and operational site for the proponent's marine contracting business.

B. An area which will be utilized primarily for a 240 slip marina and associated parking and;

C. An area which will be used exclusively for office and industrial purposes.

Tables 1 and 2 set forth the previous and proposed building uses respectively.

Copies of this may be obtained from:
Name: Eugene Peck Firm/Agency: Briggs Associates, Inc.
Address 400 Hingham St., Rockland, MA 02370 Phone No. (617) 871-6040

THIS IS AN IMPORTANT NOTICE. COMMENT PERIOD IS LIMITED.

Use This Page to Complete Narrative, if necessary.

The 18.5± acre site is surrounded by East Boston piers 1-5 to the west, the Massport Ferry Pier/Fireboat Dock to the east, the Jeffries Point neighborhood to the north and the harbor Pierhead and Bulkhead line to the south. The East Boston Shipyard was operated by the Boston Shipyard Corp (BSC) through 1985. It contains eleven (11) buildings and five (5) piers. BSC was unable to profitably operate the facility as a large scale ship building and repair facility due to the downward trend in this market. It became available for sale as a result of U.S. Bankrupcy Court proceedings.

Massport purchased the property in January 1986 to assure its future use would be consistent with current state policy for urban, coastal waterfront sites such as this (ie; for marine industrial and commercial uses and other marine-related uses). The project proponent, J.M. Cashman, Inc. was selected by Massport to lease the site and operate it in accordance with Massport objectives.

(Continued, Attachment A)

This project is one which is categorically included and therefore automatically requires preparation of an Environmental Impact Report: YES X * NO ______

* (A waiver is requested for the Phase I component of the project which involves reoperatio[n] of an existing dry dock and rehabilitation and reuse of 13% of the existing building space

IV. Scoping (Complete Sections II and III first, before completing this section.)

1. Check those areas which would be important to examine in the event that an EIR is required for this project. This information is important so that significant areas of concern can be identified as early as possible, in order to expedite analysis and review.

	Construction Impacts	Long Term Impacts		Construction Impacts	Long Term Impacts
...n Space & Recreation		X	Mineral Resources		
...torical			Energy Use		
...haeological			Water Supply & Use		
...eries & Wildlife			Water Pollution		
...ation, Trees			Air Pollution		
... Biological Systems			Noise	X	
...nd Wetlands			Traffic	X	X
...tal Wetlands or Beaches		X	Solid Waste		
...d Hazard Areas			Aesthetics		
...micals, Hazardous Substances,			Wind and Shadow		
...h Risk Operations			Growth Impacts		
...logically Unstable Areas			Community Housing and the Built Environment		
...tural Land					
... (Specify)					

2. List the alternatives which you would consider to be feasible in the event an EIR is required.

The project is being designed within the framework of Massport objectives. The proj[ect] proponent has no other sites available to him. The only other alternative is to abandon the project. (See Narrative)

E. Has this project been filed with EOEA before? Yes ______ No X
If Yes, EOEA No. __________ EOEA Action? __________

F. Does this project fall under the jurisdiction of NEPA? Yes ______ No X
If Yes, which Federal Agency? __________ NEPA Status? __________

G. List the State or Federal agencies from which permits will be sought:

Agency Name	Type of Permit
U.S. Army Corps. of Engineers	Section 10
U.S. Coast Guard	
Mass. Coastal Zone Management	Consistency Determination

H. Will an Order of Conditions be required under the provisions of the Wetlands Protection Act (Chap. 131, Section 40)?
Yes X No ______
DEQE File No., if applicable: __________

I. List the agencies from which the proponent will seek financial assistance for this project:

Agency Name	Funding Amount
NONE	

II. PROJECT DESCRIPTION

A. Include an original 8½ x 11 inch or larger section of the most recent U.S.G.S. 1:24,000 scale topographic map with the project area location and boundaries clearly shown. Include multiple maps if necessary for large projects. Include other maps, diagrams or aerial photos if the project cannot be clearly shown at U.S.G.S. scale. If available, attach a plan sketch of the proposed project.

B. State total area of project: 18.5 acres
Estimate the number of acres (to the nearest 1/10 acre) directly affected that are currently:

1. Developed .... 18.5 acres
2. Open Space/Woodlands/Recreation 0 acres
3. Wetlands .... 0 acres
4. Floodplain .... 18.5 acres
5. Coastal Area .... 18.5 acres
6. Productive Resources
   - Agriculture .... 0 acres
   - Forestry .... 0 acres
   - Mineral Products .... 0 acres

C. Provide the following dimensions, if applicable:
Length in miles N/A Number of Housing Units 0 Number of Stories N/A

	Existing	Immediate Increase Due to Project
Number of Parking Spaces	505*	450*
Vehicle Trips to Project Site (average daily traffic)	3,006 Ref Table 3	963**
Estimated Vehicle Trips past project site	N/A	N/A

D. If the proposed project will require any permit for access to local or state highways, please attach a sketch showing the location of the proposed driveway(s) in relation to the highway and to the general development plan; identifying all local and state highways abutting the development site; and indicating the number of lanes, pavement width, median strips and adjacent driveways on each abutting highway; and indicating the distance to the nearest intersection.

**From calculations by Briggs Associates, Inc. based on building uses shown on Tab

III. ASSESSMENT OF POTENTIAL ADVERSE ENVIRONMENTAL IMPACTS

Instructions: **Consider direct and indirect adverse impacts, including those arising from general construction and operations. For every answer explain why significant adverse impact is considered likely or unlikely to result.**

Also, state the source of information or other basis for the answers supplied. If the source of the information, in part or in full, is not listed in the ENF, the preparing officer will be assumed to be the source of the information. Such environmental information should be acquired at least in part by field inspection.

A. Open Space and Recreation

1. **Might the project affect the condition, use or access to any open space and/or recreation area?**
   Yes X **No** ____

   Explanation and Source:

   The addition of a large marina will enhance the use and recreational values of the site and result in an increase of public acess by opening a large portio formerly private industrial waterfront to public use. The marina facility will be located adjacent to the proposed Lobster Terminal and Park site. The Jeffer Point neighborhood and the general public will benefit from access to the waterfront via the marina.

   Source: Briggs Associates, Inc.

B. Historic Resources

1. **Might any site or structure of historic significance be affected by the project?** **Yes** ____ **No** X

   Explanation and Source:

   No site or structure of historical significance is located on the site. No structures in the site vicinity (1 mile radius) are listed on the National Register.

   Source: Massachusetts Historical Commission; Boston Landmarks Commission

2. **Might any archaeological site be affected by the project?** **Yes** ____ **No** X

   Explanation and Source:

   No known archaeological sites are located on the site.

   Source: Massachusetts Historical Commission.

C. Ecological Effects

1. **Might the project significantly affect fisheries or wildlife, especially any rare or endangered species?**
   Yes ____ **No** X

   Explanation and Source:

   The site is an established marine industrial site located in a designated port area. There are no known occurrances of state or federally listed rare wildlif or significant natural communities in this area.

   Source: Massachusetts Natural Heritage Program

2. Might the project significantly affect vegetation, especially any rare or endangered species of plant?
Yes ______ No X
(Estimate approximate number of mature trees to be removed: ________)

Explanction and Source:
The site is an existing marine industrial facility. There are no known occurrenc of state or federally listed plants or significant natural communities in this ar

Source: Massachusetts Natural Heritage Program

3. Might the project alter or affect flood hazard areas, inland or coastal wetlands (e.g., estuaries, marshes, sand dunes and beaches, ponds, streams, rivers, fish runs, or shellfish beds)? Yes ______ No ______

Explanation and Source:

No alteration or dredging of coastal wetlands will be associated with the proposed project. No adverse impacts to flood hazard areas are anticipated.

Source: Briggs Associates, Inc.

4. Might the project affect shoreline erosion or accretion at the project site, downstream or in nearby coastal areas? Yes ______ No X

Explanation and Source:

The site is part of an existing marine industrial shoreline in a major deep water port facility. The shoreline is stabilized by bulkheads and offshore areas have been dredged to 30-35'feet. Consequently littoral processes are unable to erode or accrete.

Source: Briggs Associates, Inc.

5. Might the project involve other geologically unstable areas? Yes ______ No X

Explanation and Source:

Source: Briggs Associates, Inc.

D. Hazardous Substances

1. Might the project involve the use, transportation, storage, release, or disposal of potentially hazardous substances?
Yes X No ______

Explanation and Source:

Industrial chemicals to be used and stored on the site will be similar to those used by the previous owners, a major marine shipbuilding and repair facility. hazardous substances include: oil and gas, paints and solvents and other chemic associated with a commercial marine repair facility. A management plan is curr being developed for the safe control of these substances

E. Resource Conservation and Use

1. **Might the project affect or eliminate land suitable for agricultural or forestry production?**
   Yes _____ No _X__
   (Describe any present agricultural land use and farm units affected.)

   Explanation and Sou. ce:

   No portion of the site has potential for agricultural or foresty production.

   Source: Briggs Associates, Inc.

2. **Might the project directly affect the potential use or extraction of mineral or energy resources (e.g., oil, coal, sa: 1 & gravel, ores)? Yes _____ No _X__**

   Exp. nction and Source:

   The project site has no economic potential for mineral extraction.

   Source: Briggs Associates, Inc.

3. **Might the operation of the project result in any increased consumption of energy? Yes _____ No _X__**

   Explanation and Source:
   (If applicable, describe plans for conserving energy resources.)

   The proposed project will consume less energy than the peak consumption of the former operatons. Construction of the marina facilities will include state of art energy saving techniques.

   Source: Briggs Associates, Inc.

F. Water Quality and Quantity

1. **Might the project result in significant changes in drainage patterns? Yes _____ No _X__**

   Explanation and Source:

   Existing structures will remain. Consequently,no change in site drainage is anticipated.

   Source: Briggs Associates, Inc.

2. **Might the project result in the introduction of pollutants into any of the following:**

(a) Marine Waters	**Yes** _X___	**No** ____
(b) Surface Fresh Water Body	**Yes** _____	**No** _X__
(c) Ground Water	**Yes** _____	**No** _X__

   Explain types and quantities of pollutants.
   All measures will be taken to control the emission of oil and grease and other pollutants associated with a marina. However tidal flushing is sufficient that the overall effect on Boston Harbor will be negligable.

   Source: Briggs Associates, Inc.

3. Will the project generate sanitary sewage? Yes X No ____

If Yes, Quantity: 8,100 gallons per day

Disposal by: (a) Onsite septic systems .... Yes ____ No ____

(b) Public sewerage systems .... Yes X No ____

(c) Other means (describe) ____

Source: Briggs Associates, Inc.

4. Might the project result in an increase in paved or impervious surface over an aquifer recognized as an important present or future source of water supply? Yes ____ No X

Explanation and Source:

No aquifer exists on or near the site.

Source: Briggs Associates, Inc.

5. Is the project in the watershed of any surface water body used as a drinking water supply?

Yes ____ No X

Are there any public or private drinking water wells within a 1/2-mile radius of the proposed project?

Yes ____ No X

Explanation and Source:

Source: Briggs Associates, Inc.; U.S.G.S. Water Supply report.

6. Might the operation of the project result in any increased consumption of water? Yes X No ____

Approximate consumption 9,500 gallons per day. Likely water source(s) public

Explanation and Source:

Consumption estimate is based on projected sewage figures.

Source: Briggs Associates, Inc.

7. Does the project involve any dredging? Yes ____ No X

If Yes, indicate:

Quantity of material to be dredged ____

Quality of material to be dredged ____

Proposed method of dredging ____

Proposed disposal sites ____

Proposed season of year for dredging ____

Explanation and Source:

Existing water depths at the site range from 12 to 35 feet and no dredging is planned.

Source: J. M. Cashman, Inc.

G. Air Quality

1. Might the project affect the air quality in the project area or the immediately adjacent area?
   Yes ____ No _X_

   Describe type and source of any pollution emission from the project site. Vehicle Exhaust Emissions

Normal amounts of emmissions from construction equipment can be anticipated during marina construction. Post construction vehicle emmissions will not be increased to levels that will cause adverse impacts.

Source: Briggs Associates, Inc.

2. Are there any sensitive receptors (e.g., hospitals, schools, residential areas) which would be affected by any pollution emissions caused by the project, including construction dust? Yes _X_ No ____

   Explanation and Source:

A residential area including one elementary school are located adjacent to the site. Long term emissions will not be increased to levels that will adversely affect this area.

Source: U.S.G.S. Boston South Quadrangle

3. Will access to the project area be primarily by automobile? Yes _X_ No ____
   Describe any special provisions now planned for pedestrian access, carpooling, buses and other mass transit.

Plans for a future water taxi service from downtown Boston area are currently being developed.

Source: Briggs Associates, Inc.

H. Noise

1. Might the project result in the generation of noise? Yes _X_ No ____

   Explanation and Source:
   (Include any source of noise during construction or operation, e.g., engine exhaust, pile driving, traffic.)

Pile driving and other activities related to the construction of marina facilities will temporarily raise noise levels. Post construction noise levels will be reduced from previous levels because of reduced industrial activities at the facility.

Source: Briggs Associates, Inc.

2. Are there any sensitive receptors (e.g., hospitals, schools, residential areas) which would be affected by any noise caused by the project? Yes X__ No ____

   Explanation and Source:

One elementary school and a residential area are located within 1/4 mile of the project site.

Source: U.S.G.S. Boston South Quadrangle

I. Solid Waste

1. Might the project generate solid waste? Yes X No ___

Explanation and Source:
(Estimate types and approximate amounts of waste materials generated, e.g., industrial, domestic, hospital, sewage sludge, construction debris from demolished structures.)

Estimated Quantities:

Office and shop facilities 350-500 lbs per day
Marina 900 lbs per day (seasonal)
Solid waste generation will be varible. Generation from the marina will be seasonal. Office and shop generation will fluctuate according to market conditions.

Source: Briggs Associates, Inc.

J. Aesthetics

1. Might the project cause a change in the visual character of the project area or its environs?
Yes ___ No X

Explanation and Source:

The proposed project will maintain the previous marine industrial use of the site. The development of marina facilities will soften the harshness of an industrial seascape and enhance the aesthetic value.

Source: Briggs Associates, Inc.

2. Are there any proposed structures which might be considered incompatible with existing adjacent structures in the vicinity in terms of size, physical proportion and scale, or significant differences in land use?
Yes ___ No X

Explanation and Source:

Proposed uses of site will remain water dependent.

Source: Briggs Associates, Inc.

3. Might the project impair visual access to waterfront or other scenic areas? Yes ___ No X

Explanation and Source:

Existing structures will remain. No new structures are proposed. The proposed marine development will enhance the aesthic values of the site.

Source: Briggs Associates, Inc.

K. Wind and Shadow

1. Might the project cause wind and shadow impacts on adjacent properties? Yes ___ No X

Explanation and Source:

Existing structures will remain. The addition of a marina will cause no additional wind and shadow impacts.

Source: Briggs Associates, Inc.

IV. CONSISTENCY WITH PRESENT PLANNING

A. Describe any known conflicts or inconsistencies with current federal, state and local land use, transportation, open space, recreation and environmental plans and policies. Consult with local or regional planning authorities where appropriate.

Massport purchased the property for the purpose of ensuring future marine industrial and water dependent use of the site. This action represents one portion of the states' efforts to maintain the harbor's maritime industrial infrastructure in the face of an adverse economic climate for marine industrial facilities. J.M. Cashman Inc., the project proponent, was selected to lease the site through open public competition. The Cashman proposal is designed to meet Massport and state policy objectives.

(See Narrative)

V. FINDINGS AND CERTIFICATION

A. The notice of intent to file this form has been/will be published in the following newspaper(s):

(Name) Boston Globe (Date) ______

Boston Herald

~~East Boston Times~~ ______

East Boston Community News ______

B. This form has been circulated to all agencies and persons as required by Appendix B.

______ ______

Date **Signature of Responsible Officer or Project Proponent**

Alan Perrault

Name (print or type)

Address 800 Bridge Street, P.O. Box
No. Weymouth, MA 02191-0075

Telephone Number (617) 337-1500

______ ______

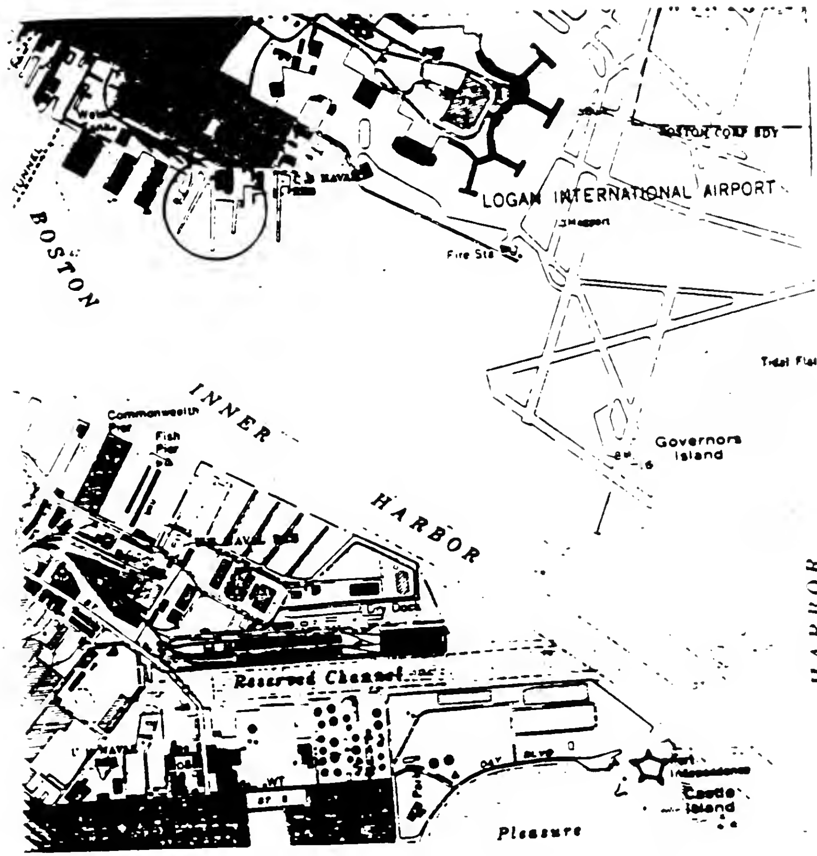
Date **Signature of person preparing ENF (if different from above)**

Roderick . Gaskell

Name (print or type)

Address 400 Hingham Street
Rockland, MA 02370

No. (617) 871-6040



SITE LOCATION MAP

From U.S.G.S. Boston South 7.5 Minute Quadrangle
scale 1:24,000

ATTACHMENT A

I. Project Summary

J.M. Cashman, Inc., the project proponent, is one of the east coast's oldest and largest marine contractors. The proponent's proposal was selected by Massport,through a public process, over two alternatives proposed by other development teams. Cashman proposes to directly operate some components and sublease other components of the project. First Priority will be given to tenants who wish to sublease space for marine-related industrial, commercial and office uses. The following provides further detail on the three general components of the proposed reuse of the existing Boston Shipyard Corp. (BSC) facilities (Ref. Figures 1 and 2, Tables 1 and 2):

A. Ship Repair and Marine Contracting Component

The proponent proposes to rehabilitate building 7 and utilize it and the surrounding yard area to:

1. Reopen, manage and operate the existing 256' graving dry dock for ship repair.

2. Manage the operational component of the J.M. Cashman, Inc. marine contracting company

These two operations will involve 12-15 Cashman employees, the storage and docking of some of Cashman's marine contracting equipment between jobs (eg; trucks, tugboats, barges, cranes, scows and pile drivers) and ship repair activities including welding, sand blasting and spray painting. The operation of Cashman's marine contracting equipment will occur primarily off site, at job locations.

The other buildings within this component (ie; buildings 3, 4, 5 and 6) will be rehabilitated and subleased by Cashman for a mixture of industrial, commercial and office uses.

B. Marina Component

A 300 slip recreational marina, with supporting parking, will be provided within this component of the proposed project. The slips will be designed around the 875' and 1020' piers. (Ref. Figure 2) These piers will be upgraded and maintained with income generated from the marina sales, service and operation. This will preserve Massports option to return the piers to large scale ship repair use should market demand for such facilities return to Boston Harbor after expiration of Massport's lease with the project proponent.

The marina operation will be partially or totally subleased by Cashman and the buildings within the area (ie; buildings 8, 9 and 10) will be rehabilitated and subleased for a mixture of marina and non-marina office, industrial and commercial uses. (Ref. Table 2)

C. Office and Industrial Component

This component of the project, involving the smallest area of the three components, will result in the rehabilitation and subleasing of an existing office building and machine shop (buildings 1and 2 respectively).

In general, the proposed reuse of the existing East Boston shipyard, when compared to the previous use by BSC, will;

1. Increase office use from 16%± to 28%±;
2. Decrease industrial use from 53%±to 40% and;
3. Maintain warehouse use at approximately the same level (Ref. Tables 1 and 2).

A portion of the BSC ship repair capacity (eg; the 256' graving dry dock) will be maintained and, to the extent possible within the market place, the rehabilitated buildings will be subleased for marine related office, industrial and commercial purposes. Finally, the rehabilitation and operation of all existing buildings shall be carried out in a manner that does not foreclose Massport's option to return the entire site to a large scale ship repair facility once the proponent's lease has expired.

II. TRAFFIC

The site abuts a residential community which experiences moderate commercial traffic. (Ref. Figure 3) The neighborhood street system predominately consists of roadways that serve the abutting residential land uses and therefore may be classified as local or minor. There are, however, a few collector streets including Sumner Street, Border Street, Meridian Street, and Bennington Street which may be classified as major collector or arterial roadways. Although these arterials are reasonably distant from the project locus, they serve to disperse traffic locally and carry through traffic to and from other communities such as Chelsea and Revere. Consequently, they may be considered as part of the roadway system which will be influenced by uses on the site.

There is no direct roadway access from the site to Logan Airport. Travel to and from Logan involves the use of the local system via Porter Street. The only exception is an access roadway that runs along the southerly border of the airport which serves primarily emergency and maintenance traffic.

Connection to downtown Boston from the site community is primarily via the MBTA and the Callahan and Summer Tunnels.

A survey of existing traffic patterns within the immediate neighborhood

indicates satisfactory level of service operations (ie; road capacity is sufficient to handle neighborhood traffic volumes.) The level of service operations deteriorates, however, when the survey area is enlarged to include arterial roadways that connect East Boston to neighboring communities.

The "existing" traffic generated from the site is assumed to be that which was generated from the peak of the BSC operation. This is because BSC operated the shipyard within the recent past (ie; through the end of 1985) and because the site has been purchased by Massport to insure that it continues to be operated for similar maritime-related industrial and commercial purposes.

The estimated traffic generation from the peak BSC use (ie; existing conditions) is calculated to have a total ADT (Average Daily Trips) of 3,006 with an estimated peak of 150 to 240 vehicles per hour. (Ref. Table 3) Increases in projected traffic generation over these amounts, if any, which result from the proposed full reuse of the site can be mitigated in several ways including;

1. Employment of neighborhood residents, to the extent possible, who can walk to and from the site;

2. Increased use of mass transportation (both the MBTA which is readily available at the nearby Maverick Station and commutor boats);

3. Staggering work hours;

4. Car pooling and;

5. Proper design of traffic circulation, operation and parking within the site to ensure there are no encroachments on the abutting land uses and roadways.

Briggs Associates, Inc.

III. Description of the Marine Environment

A. Climate

Located at 42 degrees north latitude, the site in East Boston, Massachusetts has the cool, semi-humid climate typical of New England. Its coastal location moderates the extremes experienced in inland portions of the region but exposes it to seasonal coastal storms. Based on 109 years of record, the mean annual temperature of Boston, Massachusetts is 50.8°F Extreme temperatures range from 104 F to -14°F. The mean annual precipitation is 41.54 inches and the mean annual snowfall is 43 inches based on 110 years of record.

B. Winds and Tides

Prevailing winds are onshore, approaching the site from a wester[illegible] direction. Onshore winds most frequently blow from the east-southeas[illegible] direction. Onshore winds from the east to northeast quadrants have a higher averag[illegible] Offshore winds from the east to northeast quadrants have a higher averag[illegible] velocity and a shorter duration. The average wind speed from all directior[illegible] is 13 miles an hour.

The mean tidal range at Boston Harbor is approximately 9.5 fee[illegible] Stillwater tide heights associated with storm surge reach elevations [illegible] 10.3 feet (NGVD) during events of 100 year frequency and 10.0 ft (NGV[illegible] during events of 50 year frequency. Tidal currents flood to the north ar[illegible] ebb to the south.

C. Water Quality

According to a 1977 report by Massachusetts Coastal Zone Manageme[illegible] Boston Harbor waters are classified as SC (suitable for recreatio[illegible] boating, fishing and industrial purposes but not for swimming or

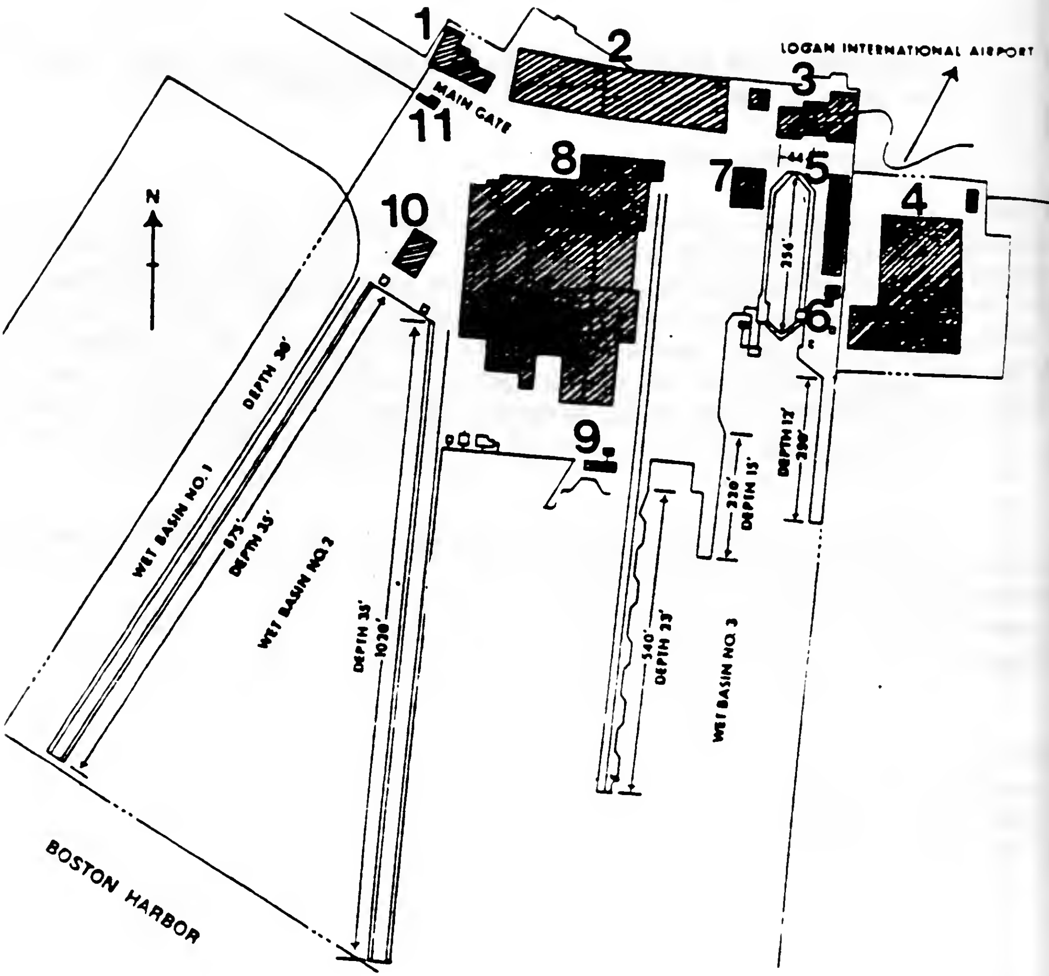
shellfishing. The primary cause of dergedation of harbor water quality is the direct deposit of sewage sludge in Boston Harbor.

D. Coastal Resources

The proposed project location is within Boston inner harbor, a highly developed port facility. A deepwater shipping channel maintained at 40 feet depth is adjacent to the site. The site is constructed on fill and the entire shorefront is bulkheaded. Consequently, "Land under the Ocean" is the only coastal resource area at the site which is protected by the Massachusetts Wetlands Protection Act. Shellfish in Boston Harbor are contaminated and require treatment before human consumption. Therefore the proposed project is not likely to interfere with the extraction of this resource.

Because of the bulkheading and adjacent deep water, erosion and accretion are not likely to be significant.

FIGURE 1

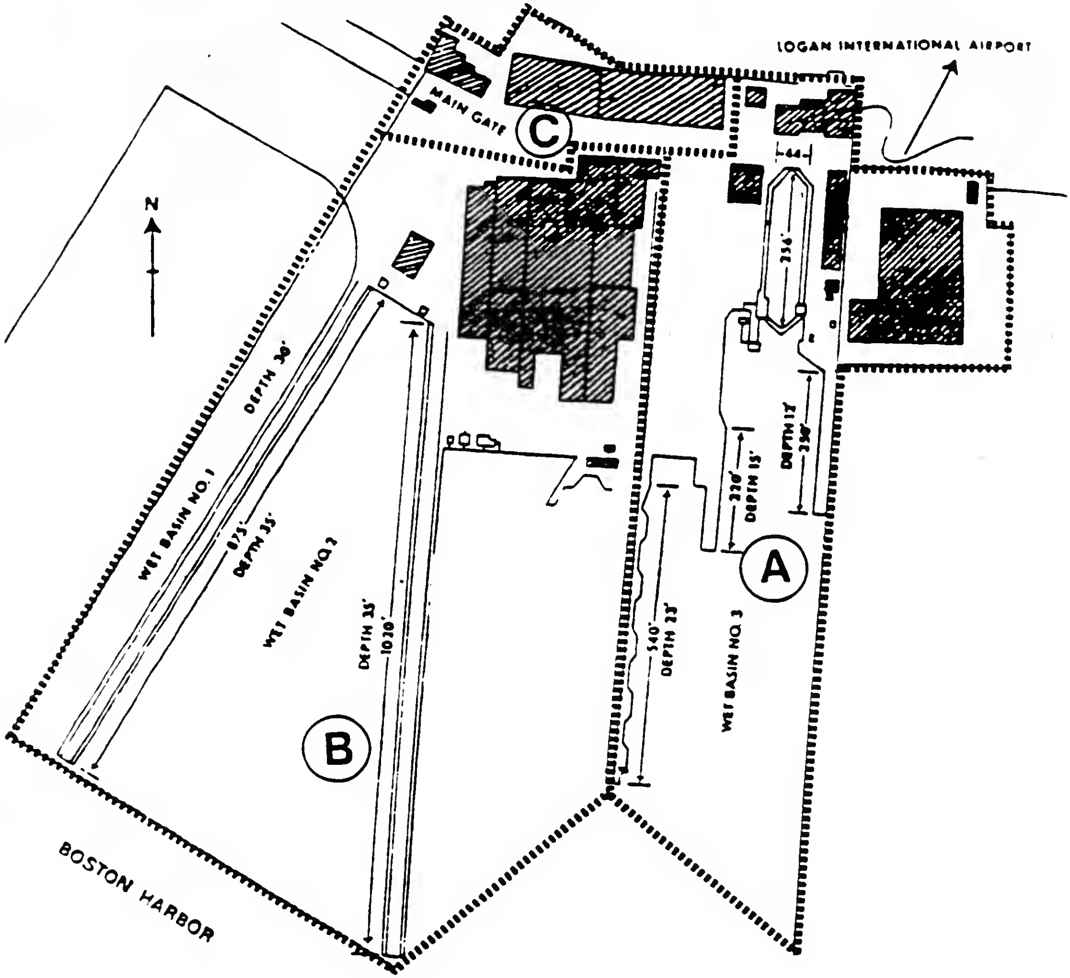


EXISTING BUILDINGS

(REFER TO TABLES 1 & 2 FOR NAMES, FLOOR AREA, AND EXISTING AND PROPOSED USES OF THE NUMBERED BUILDINGS)

FIGURE 2

GENERALIZED AREAS OF PROPOSED USE



AREA	USE
A	SHIP REPAIR; MARINE CONTRACTING; INDUSTRIAL
B	OFFICE; MARINA; BOAT SERVICE, SALES & STORAGE; ASSOCIATED PARKING
C	OFFICE; INDUSTRIAL

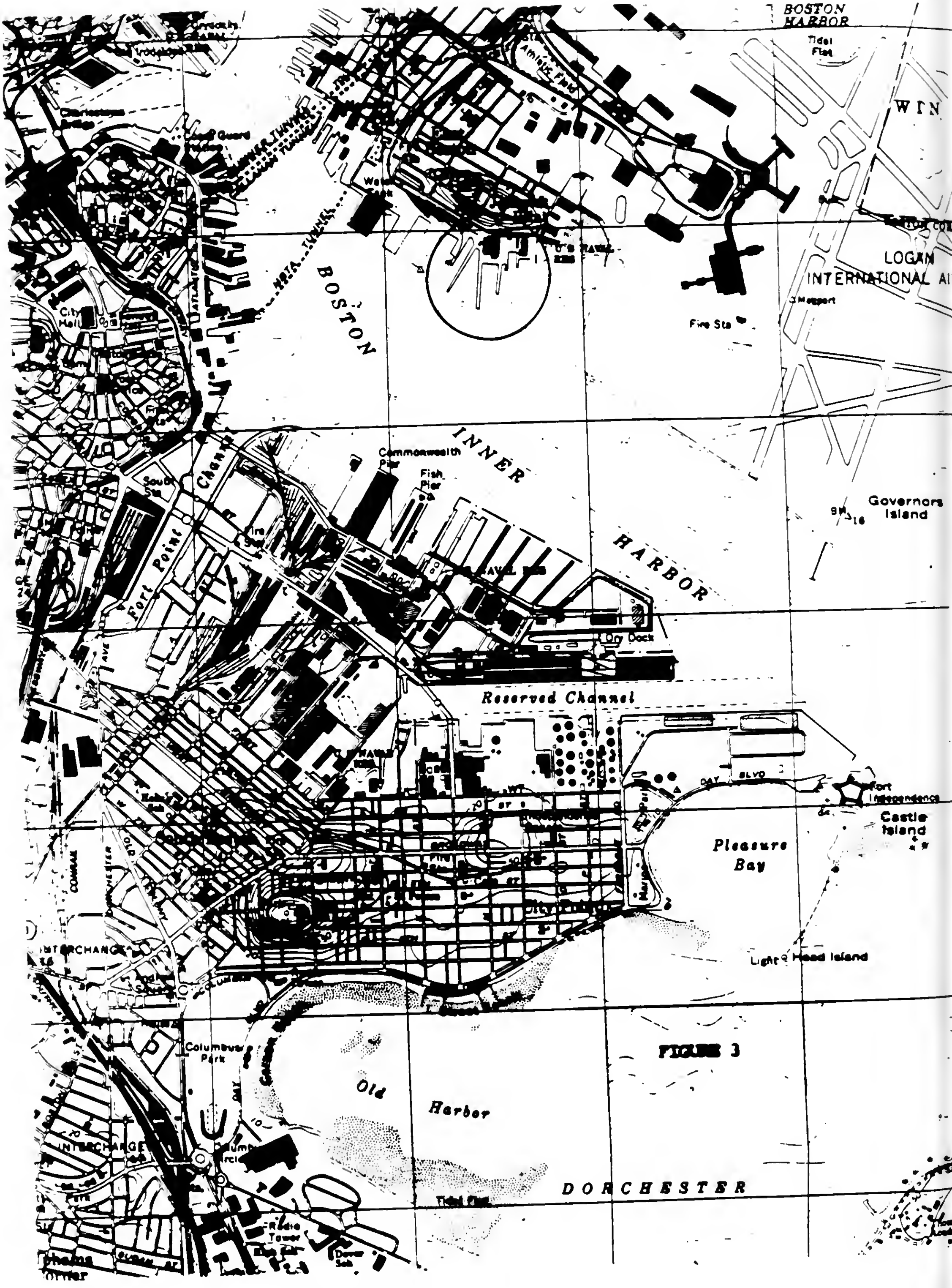

BOSTON HARBOR
Tidal Flat
Charlestown Bridge
Coast Guard
Athletic Field
WIN
LOGAN
INTERNATIONAL AIR
Fire Sta
City Hall
BOSTON
INNER
HARBOR
Commonwealth Pier
Fish Pier
Fort Point Channel
South Sta
Dry Dock
Reserved Channel
Governors Island
Fort Independence
Castle Island
Pleasure Bay
Light
Head Island
INTERCHANGE
Columbus Park
Old
Harbor
INTERCHANGE
DORCHESTER
Tidal Flat
Radio Tower

FIGURE 3

TABLE I

Boston Shipyard Corp (BSC)[1]

Use Categories (in square feet)

Bldg No.[2]	Bldg Name	Floor area (sf)	Year Built	Construction Type & Features	BSC Use Types	Office (Comm. & Professional)	Industrial (Light, Med. Heavy)	Dormitory	Food Preparation & Serving	Warehouse & Storage	Retail Sales & Service
1	Administration Building	14,400	1942	-3+ floors, concrete block -views of Boston Harbor, Boston Skyline -no elevator -partitioned into offices and meeting rooms of varying sizes -single pane windows, no insulation -flat roof, sprinkler system	Central Office facility for shipyard administration	14,400 (100%)					
2	Machine Shop	20,200	1919& 1942	-1 floor, concrete block -22'-24' ceilings, 3 bridge cranes -22' high overhead door -no insulation flat roof- sprinkler system	Machine shop for machine work including ship and marine repair involving the operation of 20' + lathes, 12' vertical boring mills, 10' horizontal boring mills, shapers, drill presses to 600 ton		20,200 (100%)				
3	Barracks Building	16,500	1939	-2 floors, concrete block -large industrial kitchen -300 seating for food service, high ceilings -some operable walls -large shower facility to support dormitory -no insulation -flat roof -sprinkler system	Dormitory facility for crew members of ships being repaired at shipyard. Kitchen facilities used to prepare food in support of shipyard operation			8,250± (50%)	8,250± (50%)		
4	Immigration Building	22,800	1926	-1+floors, concrete block, 20'-25' ceilings, open warehouse space -15+' overhead doors -no insulation flat roof-no sprinklers	Warehouse, light industrial fabrication with supporting offices	2,280 (est)[3] (10%)	6,840 (est) (30%)			13,680 (est) (60%)	
5	Wood-working Shop	10,200	1928	-2 floors, concrete block and brick -located next to and has operational view of 250' graving dock -second floor in poor condition -flat roof	Carpentry, wood-working and painting primarily in support of shipyard operation		10,200 (100%)				
6	Paint Storage Shed	400	1982±	-1 floor, high ceiling -steel frame -metal siding	Paint storage					400 (100%)	
7	Electrical Shop	7,250	1928	-2 floors, block with brick facing -near 250' graving dock	Electrical repair, supply storage and related offices primarily in support of shipyard operat.	725 (est) (10%)	4,350 (60%)			2,175 (est) (30%)	
8	Combination Building	88,600	1904-1943	-1-3 floors, combination of construction types including concrete block with brick face and steel frame with corrugated metal siding -unobstructed access to water-large open areas, 35+' ceilings - bridge cranes -numerous shop -storage and office areas	Sheet metal, piping, plating and fabrication in support of shipyard operation. Central electrical power and boiler operation for shipyard. Mold loft riggers and supporting offices	13,290 (est) (15%)	53,160 (est) (60%)			22,150 (25%)	
9	Head House	300	1903	-2 floors, concrete block with brick face -direct view of piers and harbor -house D.D. #2 pump control and toilets- small office space	Shipyard toilet facility and offices for pier operation	300 (100%)					
10	Officer's Quarters	6,100	1940	-2 floors-concrete block-many small rooms-commercial laundry facility and kitchen	Women's dormitory, kitchen and laundry/dry cleaning facility in support of shipyard operation			1,830 (30%±)	1,220 (20%±)		3,050 (est) (50%±)
11	Gatehouse	740	1940	-1 floor-concrete block-located at entrance of site	Shipyard guard house/control point	740 (100%)					
					TOTAL[4]	31,735 (16%)	103,850 (53%)	10,080 (5%)	9,470 (5%)	38,405 (19%)	3,050 (2%)

1 Total peak BSC employees, 800±
2 Refer to figure 1 for building numbering and location
3 Est. = estimated from general knowledge of past BSC uses
4 Total area all 11 buildings = 196,800 sq. ft

Building No [1]	Building Name	Proposed Use Types	Office (Comm and Professional)	Industrial (Light, Med, Heavy) incl Marine	Dormatory	Food Preparation & Serving	Warehouse & Storage	Retail Sales & Service
1	Administration Building	Marine related and general office space (mix depends upon market for marine office space)	14,460 (100%)					
2	Machine Shop	Marine related and general machine shop use (mix depends upon market for marine machine shop space. Use may involve partial or total redesign of interior space depending upon the needs of subtenants)		29,300 (100%)				
3	Barracks Building	Approximately 50% of space to be used for mixture of marine related and general office space (mix depends upon market for marine office space). Remaining 50% ± to be used for food catering service for harbor cruise and commutor boats and for surrounding industries and offices.	8,250 (50%±)			8,250 (50%±)		
4	Immigration Building	Approximately 60% to be used for marine related and general industry (mix depends on market for marine industrial space). Approximately 40% to be used for general warehouse purposes.		13,680 (60%)			9,120 (40%)	
5	Woodworking Shop	Light industry, first floor. Office space, second floor.	5,100 (50%)	5,100 (50%)				
6	Paint Storage Shed	Same use as BSC or demolish					400 (100%)	
7	Electrical Shop	Operations, supply and storage facilities for J M Cashman, Inc. marine contracting business and for running the 256 graving dock ship repair facility (also to be run by J.M. Cashman, Inc.)	1,815 (25%)	3 630 (50%)			1,815 (25%)	
8	Combination Building	Marine related and general office space (mix depends upon market for marine office space). Recreational boat sales, service, repair and storage.	17,720 (20%)	26,580 (30%)			17,720 (20%)	26 580 (30%)
9	Head House	Marine Dock Master office and toilet facility for marina users or demolish	300 (100%)					
10	Officer's Quarters	Office space or demolish to provide additional space for marina operation.	6,100 (100%)					
11	Gate House	Office space or demolish	740 (100%)					
		TOTAL[2]	54 485 (28%)	78 290 (40%)	0	8 250 (4%)	29,055 (15%)	26 580 (13%)

1 Refer to Figure 1 for building numbering
2 Total area of all 11 buildings = 196,660 sq ft ±

TABLE 3

ESTIMATED TRAFFIC GENERATION*
FROM
BOSTON SHIPYARD CORP (BSC) USE

Existing Uses

USE CATEGORY/ SQ.'	Trip ends per 1000 sq.'	ADT
Office: 31,796 ITE Land Use Code 711	31.796 x 17.70 =	563
Industrial: 103,856 ITE Land Use Code 100	103.856 x 5.43 =	564
Dormatory: 10,080 ITE Land Use Code 270	0.231 x 46.80 =	11
Food Preparation: 9,470 and Serving ITE Land Use Code 832	9.47 x 164.40 =	1,557
Warehouse: 38,408 and Storage ITE Land Use Code 150	38.408 x 4.88 =	187
Retail Sales: 3,050 and Service ITE Land Use Code 814	3.05 x 40.70 =	124
	TOTAL	3 006

With an estimated peak of 150 to 240 vehicles per hour

*Categories and multiplication factor (trip ends per 1,000 sq.') from _Trip Generation Manual_, 1983, Institute of Transportation Engineers.

APPENDIX C

MASSPORT LETTER

massport
SSPORT, TEN PARK PLAZA, BOSTON, MA 02116-3971, (617) 973-5500 TELEX 94-0365

January 26, 1988

Jay M. Cashman, President
Cashman Marine Enterprises
800 Bridge Street
North Weymouth, MA 02191

Re: Boston Marine Works Final EIR
Chapter 91 Tideland Issues

Dear Mr. Cashman:

Reference is made to a Long-Term Lease dated April 30, 1987 between the Massachusetts Port Authority ("Massport"), as landlord and Cashman Marine Enterprises, as tenant, with respect to certain shipyard premises located on Marginal Street in East Boston more particularly described therein (the "Lease"). Capitalized terms not defined herein shall have the meanings given them in the Lease.

Under the Lease, you are required to prepare an Environmental Impact Report ("EIR") pursuant to the Massachusetts Environmental Policy Act acceptable to us and the Secretary of the Executive Office of Environmental Affairs ("Secretary") with respect to activities to be performed on the premises including ship repair, marina and other marine related uses. In response to your previous submission of a draft EIR, the Secretary has requested that the final EIR address the applicability to Massport of M.G.L. Chapter 91 and local zoning, specifically, Harbor Park standards and the proposed Harborpark Marine Economic Reserve Zone.

Under Massport's enabling legislation, Chapter 465 of the Acts of 1956 (the "Act"), Massport and its projects are exempt from the licensing requirements of Chapter 91. Section 2 of the Act provides that Massport " . . . shall not be subject to the supervision or regulation of the department of public works or any department, commission, board, bureau or agency of the commonwealth except to the extent and in the manner provided in this act." No provision in the Act would subject Massport projects to the licensing requirements of Chapter 91. In fact, Section 6 of the Act goes on to provide an express exemption of Massport projects from the requirement of Chapter 91 licenses.

Your proposed activities under the Lease are in furtherance of Massport's plans for development of the Port of Boston. A requirement that you obtain a Chapter 91 License as a condition to performing any such activities would be inconsistent with the rights, powers and purposes over the Port of Boston vested in Massport under the Act.

Similarly, with respect to zoning, Massachusetts case law is clear that the essential governmental functions of a State created Authority are not subject to municipal zoning regulations absent a statutory provision to the contrary. Both the acquisition of the former Boston Shipyard and the Lease to Cashman Marine Enterprises were and continue to be an exercise of Massport's essential governmental function. Despite this exemption, Massport believes that it and the City of Boston share similar objectives for Boston Harbor. Thus, Massport in furtherance of its essential governmental functions has, in the development of its waterfront properties, consistently taken into consideration the objectives of the City of Boston as expressed in the Harborpark and Marine Economic Reserve Zone policies.

This letter has been provided in response to your inquiry as to Massport's position on these matters. It is within your discretion whether to claim the exemptions discussed in this letter.

Very truly yours,

MASSACHUSETTS PORT AUTHORITY

Charles E. Dewitt, Jr.
Chief Legal Counsel

0003L(33)

APPENDIX D

LEASE SUMMARY
CASHMAN MARINE ENTERPRISES
AND
MASSACHUSETTS PORT AUTHORITY

LEASE SUMMARY

CASHMAN MARINE ENTERPRISES AND MASSACHUSETTS PORT AUTHORITY

AREA (As Defined in Massport/Cashman Lease)	BUILDINGS Included Within Area (As Defined in Lease)	AVAILABLE PIER SPACE & DOCK Included in Area	PERMITTED USES According to Lease	LEASE TERM	RENEWAL OF LEASE & CONDITIONS
AREA A	18 - Immigration Building 17 - Carpenter Shop 16 - Barracks Building 11 - Electrical Shop 36 - Offices-East Bay Area 13 - Riggers Building 14 - Locker Room 15 & 35 - East Bay - Combination Bldg. 120,000± sf of bldg. area	Pier 2: 850 lf Pier 3: 1,100 lf* Pier 4: 450 lf* Pier 5: 425 lf* Graving Dock: 256 lf Total: 3,081 lf *: Utilizing both sides	1. Predominant ship repair If 1 is in place, then also permitted: 2. Marine contracting 3. Marine industrial 4. Marine warehousing 5. Other marine-related businesses	19 years	19 years provided predominant ship repair is still in place at a value of at least $1.5 million dollars (in 1987 CPI adjusted dollars) during any 2 years in years 14-18
AREA B	34 & 24 - West Bay, Combination Bldg. 33 & 23 - Pipe & Sheet Metal Shops 22 - Powerhouse 50,000± total sf	Pier 1: 1,750* lf Utilizing both sides	1. Marina and accessory uses including boat storage, restaurant 2. Any uses allowed in Area A under lease	25 years	13 years provided Pro-forma revenue projections are met
AREA C	31 - Administration Bldg. 32 - Machine Shop West 12 - Machine Shop East 45,0000± sf total	None	1. Office 2. Industrial 3. Manufacturing with best efforts to attract those which are marine-related	25 years	13 years provided Pro-forma revenue projections are met

APPENDIX E

ARTICLES PERTAINING TO U.S. SHIPBUILDING TRENDS

European Shipbuilders Seek Larger Subsidies

Sanctions Against Japan, S. Korea Also Sought

By BRUCE BARNARD
Journal of Commerce Staff

BRUSSELS, Belgium — The European Community's longest-running sideshows will be played out here next week when European shipbuilders urge EC officials to approve increased state subsidies for their fast-sinking industry.

The shipbuilders also want sanctions to thwart alleged pricing of ships at below market value, or dumping, by rivals in Japan and South Korea.

The script of the meeting is unchanged from those of scores of previous encounters at the EC headquarters here and at the Organization for Economic Cooperation and Development in Paris.

European shipbuilders have been passing around the begging bowl since the onset of the global shipbuilding slump 10 years ago that has wiped out a large chunk of their capacity.

The only differences are that the figures have changed, the price gap with the Far East is widening, and South Korea has replaced Japan as the bogeyman.

A suggestion that the EC could impose sanctions using procedures available under the General Agreement on Tariffs and Trade adds a new twist and underlines the desperation of Europe's shipyard executives.

GATT, based in Geneva, administers the world's trade rules.

Europe's share of world shipbuilding activity has fallen to 18%. EC yards slashed their capacity by 48% and chopped their work force from 210,000 in 1975 to 93,000 in 1985, but the hemorrhaging continues.

The EC Commission reckons that another 30,000 jobs are at risk over the next two years. The Geneva-based International Metal Workers' Federation estimates 45,000.

EC shipyards are being squeezed out of the world market, while Japan and South Korea together have hogged nearly 50% of the business. Last year, Japan accounted for 3.4 million gross tons of new orders out of a global total of 9.5 million. EC yards had 1.7 million South Korea had 1.35 million in orders but is expected to overtake Europe this year.

European shipbuilders will argue next week that they can stay afloat only with an increase in subsidies to 30% of cost. Just 10 months ago the EC put a 28% ceiling on subsidies for large ships during the next four years.

The ruling that established the 28% subsidy ceiling replaced an unwieldy system under which direct state aid was negotiated individually between member governments and the EC Commission. The governments were free to provide extra indirect subsidies in the form of incentives and tax breaks that often pushed up state aid to as high as 40% of a ship's construction cost.

Peter Sutherland, the EC's competition commissioner, said last December that the new directive on aid would add "fairness, discipline and transparency" to the state subsidies. But that claim has a hollow ring now as European yards line up for bigger handouts.

The shipbuilders' frantic lobby-

SEE EUROPE'S, PAGE 10A

Ship Orders Register New Low

Journal of Commerce Staff

LONDON — The world's shipbuilding order book slumped to a new low during the first quarter of the year.

Figures published by Lloyd's Register of Shipping show that tonnage on order at the end of March was down to 20.6 million gross tons, of which 84% is scheduled for delivery by the end of next year.

At the end of 1986, shipbuilding orders stood at almost 21.4 million gross tons, while merchant shipyards had orders of 24.3 million tons a year earlier.

Japan, the world's biggest shipbuilder, saw its order book fall by 1.6 million gross tons to 4.9 million tons during the first three months of the year.

However, South Korea, the second-largest shipbuilder, reported orders up by just over 240,000 tons to 4.5 million.

Last Merchant Vessel to Leave US Yard

Shipbuilders Mourn Nov. 9

By ROBERT F. MORISON
Journal of Commerce Staff

WASHINGTON — U.S. shipbuilders regard Nov. 9 as a black day for their industry.

On that date the last merchant vessel under construction or on order in U.S. yards will be delivered to Sea-Land Service Inc. by Bay Shipbuilding Co., Sturgeon Bay, Wis.

John J. Stocker, president of the Shipbuilders' Council of America, said the delivery was a "newsworthy event" because it is the last merchant ship and leaves the hard-pressed private yards relying on Navy building and reconstruction work and Navy and commercial repair work.

"I don't believe there has ever been a period in U.S. history when there wasn't a merchant ship being built," Mr. Stocker told a news conference to mark the occasion.

Making matters even bleaker for the industry is the fact that government merchant shipbuilding programs have been halted, even though there is a need for new tonnage. Prospects that some operators will go ahead and build without subsidy or some form of aid are uncertain.

With the additional pressure to reduce the federal budget deficit, Mr. Stocker indicated concern about future funding to build and maintain the 600-ship Navy.

> Making matters even bleaker for the industry is the fact that government merchant shipbuilding programs have been halted, even though there is a need for new tonnage. Prospects that some operators will go ahead and build without subsidy or some form of aid are uncertain.

Aggravating the situation more, Mr. Stocker added, were uncertainties, some of them caused by the government itself.

He cited such questions as whether the export of Alaskan oil will be allowed, the extent to which construction subsidies will be allowed to be repaid in return for domestic trading privileges and even the impact of the recently negotiated U.S.-Canada free trade area.

Mr. Stocker said the industry favors a number of steps in the merchant ship area, most of which would require government funds and consequently have little chance of early fruition.

Still, banking on the recent report of the Commission on the Merchant Marine and Defense, which amounted to an independent endorsement of industry warnings of maritime's decline, Mr. Stocker said shipbuilders were contemplating a public campaign to mobilize support for new, promotional measures.

That campaign probably won't begin until early next year, following release of the commission's recommendations, due in December.

Mr. Stocker said the council favors a number of steps, including:

- Support for pending trade legislation provisions to tighten requirements that the Special Trade Representative act against foreign subsidies and other aids to industries such as shipbuilding that hurt U.S. companies.
- Establishment of a $1.5 billion "Shipbuilding Intervention Fund" to provide subsidies or other aid to help U.S. builders overcome the advantages, such as subsidies and favorable financing, that foreign governments give their yards.
- Enactment of U.S.-flag preference for imported oil, a step Congress previously rejected.
- Tax credits for U.S. shippers and consignees using U.S. flags to offset any difference in costs.
- A build-and-charter program by which the government would construct tankers and charter them at low, competitive rates to private operators.
- Joint ventures, possibly through antitrust-exempt Export Trading Companies, with government support to help penetrate the foreign market for U.S.-built warships.

Mr. Stocker noted that only six states in the continental United States lack shipyards or supplier industries, so the industry can claim broad economic importance.

As recently as 1982, there were 110 privately owned yards building and repairing ships and employing 112,000 workers. That is now down to 74 facilities and an employment level of 85,000, he said.

In 1976, Mr. Stocker said, U.S. shipyards had orders for 155 vessels, about half of which were for the Navy. Now the backlog stands at 83 vessels — all for the Navy.

Western Shipbuilders Sinking In Sea of Foreign Competition

By MICHAEL ZIELENZIGER
Knight-Ridder Newspapers

SEATTLE — Cranes pirouette over the ship's yawning cargo bay. Workers in hard hats, hundreds of them, scurry along the decks of the towering Fort McHenry, readying the giant troop transport, dressed in standard Navy gray, for its final shakedown voyage.

Here at the Lockheed Shipbuilding Co. construction yard on gritty Harbor Island, in view of Seattle's sleek downtown skyline, an era will end next month when the McHenry glides into Puget Sound — and history. Shipbuilding, once a vital part of the West's economy, is locked in what one shipyard executive calls a "death spiral."

"This could be the last ship we ever build on the Puget Sound," one Lockheed manager said recently, amid the clatter of electric hammers and hydraulic lifts aboard the McHenry. "Used to be, we couldn't get enough skilled people to work here."

In the good days, generous government subsidies, union clout and supportive senators ensured that the industry was sheltered from foreign competition. But then the subsidies dried up, exposing the vulnerability of an industry hampered by poor management, intractable labor and a Pentagon no longer willing to pay for inefficiency. In the end, the experts say, Western shipbuilders — like so many U.S. manufacturers — have been forced to concede that they have lost their edge to Koreans and Japanese who work better and cheaper.

More than 50% of the West's shipyard production workers have lost their jobs since 1982; where there were 23,700, there are now only 11,600. In Seattle alone, an industry that five years ago paid high wages to 13,500 workers now employs 1,700, most of whom have accepted major pay cuts.

Thirty miles to the south, Tacoma Boatbuilding, once Pierce County's largest private employer with 2,300 workers, is fighting to right itself from bankruptcy with a work force of about 250. And at Lockheed, 700 union workers have been locked out of the plant since November, when they refused to agree to a give-back that would have reduced pay for top workers from $13.50 to $11 an hour.

The crisis in shipbuilding has been brewing for a quarter-century, as Japanese and then Korean builders perfected techniques first pioneered in the United States to build big boats with less labor.

> 'It used to take us three man-hours to do what the Japanese learned to do in one. We've decreased the ratio in many yards, we're closing the gap, but as a nation, we subsidized bum management and perpetuated inefficiency.'
> — Louis Chiarello, Shipyard Consultant

"It used to take us three man-hours to do what the Japanese learned to do in one," said Louis Chiarello, a marine engineering and construction consultant.

"We've decreased the ratio in many yards, we're closing the gap, but as a nation, we subsidized bum management and perpetuated inefficiency. The companies operated like John Wayne, saying they were tough and they knew best; then the Japanese came along and beat the hell out of us."

For years, the federal government paid U.S. shipyards up to 50% of the cost of a new commercial ship, in hopes of making them competitive with foreign builders. Altogether, the government supplied an estimated $14 billion in subsidies — payments that dwarfed the $1.5 billion bailout of Chrysler Corp.

But the Reagan administration ended the subsidies, saying they had failed to make U.S. yards more productive, and commercial construction in the United States collapsed amid worldwide overcapacity.

"Subsidy programs didn't do a thing to foster productivity, but the problem is bigger than shipbuilding; it's a national industrial problem," said Richard L. Storch, associate professor of industrial engineering at the University of Washington. "In every sector of industry, we felt comfortable and insulated and didn't work very hard to improve productivity. The shipbuilders were no different."

For a while, the industry took shelter in President Reagan's vast military buildup, which has included $20.1 billion in spending on new ships and conversions in the last five years. Yet not even the administration's drive to build a 600-ship Navy was enough to prevent shipyards nationwide from laying off nearly 25% of their production workers in that same period — and the West was hit hardest of all.

Today, five shipyards — in Newport News, Va.; Groton, Conn.; Pascagoula, Miss.; New Orleans; and Bath, Maine — account for 90% of Navy ship awards, according to industry figures.

"The rest of us are left to scratch it out," Mr. McDonnell said. "And there will be casualties."

"I see no way for the Northwest or the West Coast to compete on a national construction contract," said John P. Hayes, Lockheed vice president for administration.

Shipyard Management, Workers Blame Each Other for Problems

By MICHAEL ZIELENZIGER
Knight-Ridder Newspapers

SEATTLE — As the West's shipbuilding contracts dried up and the jobs disappeared, management and labor were left to blame each other.

The unions are at fault, the companies charge, because they refused to take the wage concessions their brother unions on the East or Gulf coasts have accepted.

"That's one of the ironies of this whole mess," said John P. Hayes, Lockheed Shipbuilding Co.'s vice president for administration. "The same unions that won't make concessions out on the West Coast give up wages on the Gulf Coast to win contracts. The same unions. They were being paid less already, then they agree to take reductions. No wonder we can't win contracts."

The companies are to blame, the unions respond, because they were poor managers and refused to play fairly.

Nate Ford, head of the International Brotherhood of Boilermakers, Iron Shipbuilders, Blacksmiths, Forgers and Helpers union local, said his workers would have accepted wage concessions, as they have at other struggling shipyards. But Lockheed never opened its books to demonstrate its losses, he argues, and never proved that it would slice benefits for managers as well as workers. "They weren't willing to negotiate, and they weren't willing to share the pain equally."

The workers' bitterness swirls around the plant gate, where small clusters of ex-Lockheed workers gather each day to jeer their replacements — some of whom are making only half the $13.50 top wage that workers once received.

"I'll clap my hands the day they shut this place down," said Herb Kaul, 50, who worked in the shipyard for 23 years. "We'd have been willing to work for less money as long as they were willing to negotiate. The world was changing; we knew that. We knew we'd have to take a cut. But they wanted to freeze our wages and give the managers bonuses. And they had more managers than they knew what to do with."

"They were supposed to negotiate in good faith, then they locked us out," said Mark Hanson, 31. "Sure the union had a part in driving prices up, but these companies are awful greedy."

As if sealing its own fate, Lockheed last month withdrew its bid on the contract for the DDG-51 guided missile destroyer, a $162 million slice of business that was subsequently awarded to Lytton Industries' Ingalls shipyard in Pascagoula, Miss.

"We couldn't bid, given the uncertainty of the labor situation," Mr. Hayes said, adding that it's "hard to say" whether Lockheed's yard will be open a year from now.

Union leaders estimate that only 20% of the laid-off workers have found other jobs. Many who haven't turn up each day at a food bank established by the King County Labor Agency for a grocery bag ration containing a loaf of white bread, margarine, canned vegetables and cookies.

"These are the new poor," said Art Clemente, who runs the program. "These are the two-car families, the guys who used to make $12 and $14 an hour with overtime. For them there was no tomorrow. Now they're taking some awful lumps."

APPENDIX F

OUTLINE OF HAZARDOUS MATERIALS MANAGEMENT PLAN

BOSTON MARINE WORKS
OIL AND HAZARDOUS MATERIALS MANAGEMENT PLAN
TABLE OF CONTENTS

TABLE OF CONTENTS (Continued)

APPENDIX G

TRAFFIC DATA

THE BOSTON MARINE WORKS
EAST BOSTON, MA

Prepared By:

HMM ASSOCIATES, INC.
Environmental Consultants, Engineers & Planners
Transportation Engineering Section
336 Baker Avenue
Concord, MA 01742

EXISTING AM AND PM PEAK HOUR OPERATIONS

CASHMAN [illegible]

INTERSECTION :
PORTER @
CHELSEA
WEEKDAY EXISTING AM 1987 CBD ? N
ACTUATED SIGNAL
#1E

V O L U M E   A D J U S T M E N T

APPROACH	LANE MVM	GROUP VOLUME	FLOW RATE IN GROUP	LANE UTIL FACTOR	ADJ FLOW RATE	PROP OF TURNS LT	PROP OF TURNS RT
EB	LTR	341	379	1.00	379	0.40	0.21
WB							
NB	TR	159	177	1.00	177	0.00	0.10
SB	LT	109	121	1.00	121	0.19	0.00

S A T U R A T I O N   F L O W

APP	MVM	IDEAL SAT FLOW	# OF LANES	ADJUSTMENT FACTORS: WIDTH	H.V.	GRADE	PARK	BUS	AREA	RT	LT	ADJ. FLOW
EB	LTR	1800	1	1.13	0.99	1.00	1.00	1.00	1.00	0.87	0.85	1489
WB												
NB	TR	1800	1	1.07	0.99	1.00	1.00	1.00	1.00	0.94	1.00	1792
SB	LT	1800	1	1.07	0.99	1.00	1.00	1.00	1.00	1.00	0.93	1773

INTERSECTION :
PORTER @
CHELSEA
WEEKDAY EXISTING AM 1987 CBD ? N
ACTUATED SIGNAL
#1E

C A P A C I T Y   A N A L Y S I S

APP	LN GR MVM	ADJ FLOW RATE	PMSV LT FLOW	ADJ SAT FLW RT	FLOW RATIO	CRIT ?	GREEN RATIO	LN GR CAPACITY	V/C RATIO
EB	LTR	379	0	1489	0.255	Y	0.529	788	0.481
WB									
NB	TR	177	0	1792	0.099	Y	0.392	703	0.252
SB	LT	121	0	1773	0.068	N	0.392	695	0.174

CYCLE LENGTH : 102.0
LOSS TIME PER CYCLE : 6

SUM OF CRITICAL LANES' FLOW RATIOS : 0.354
INTERSECTION V/C : 0.376

L E V E L   O F   S E R V I C E

APP	LN GR MVM	V/C RATIO	GREEN RATIO	CYC LEN	1st DELAY	LN GR CAP	2nd DELAY	PF	LN GR DELAY	LN GR LOS	APP DELAY	AP L
EB	LTR	0.481	0.529	102	11.5	788	0.4	0.85	10.1	B	10.0	[illegible]
WB												
NB	TR	0.252	0.392	102	15.9	703	0.0	0.85	13.5	B	13.3	[illegible]
SB	LT	0.174	0.392	102	15.4	695	0.0	0.85	13.1	B	12.9	[illegible]

INTERSECTION DELAY : 11.3 secs/veh
LEVEL OF SERVICE : B

CASHMAN

INTERSECTION :
PORTER @
CHELSEA
WEEKDAY EXISTING PM 1987 CBD ? N
ACTUATED SIGNAL
#1E

V O L U M E   A D J U S T M E N T

APPROACH	LANE GROUP MVM	VOLUME	FLOW RATE IN GROUP	LANE UTIL FACTOR	ADJ FLOW RATE	PROP OF TURNS LT	RT
EB	LTR	551	612	1.00	612	0.53	0.16
WB							
NB	TR	239	266	1.00	266	0.00	0.15
SB	LT	271	301	1.00	301	0.21	0.00

S A T U R A T I O N   F L O W

APP	MVM	IDEAL SAT FLOW	# OF LANES	WIDTH	H.V.	GRADE	PARK	BUS	AREA	RT	LT	ADJ. FLOW
				ADJUSTMENT FACTORS								
EB	LTR	1800	1	1.13	0.99	1.00	1.00	1.00	1.00	0.90	0.83	1504
WB												
NB	TR	1800	1	1.07	0.99	1.00	1.00	1.00	1.00	0.90	1.00	1716
SB	LT	1800	1	1.07	0.99	1.00	1.00	1.00	1.00	1.00	0.85	1621

CASHMAN L1E(P

INTERSECTION :
PORTER ?
CHELSEA
WEEKDAY EXISTING PM 1987 CBD ? N
ACTUATED SIGNAL
#1E

C A P A C I T Y   A N A L Y S I S

APP	LN GR MVM	ADJ FLOW RATE	PMSV LT FLOW	ADJ SAT FLW RT	FLOW RATIO	CRIT ?	GREEN RATIO	LN GR CAPACITY	V/C RATIO
EB	LTR	612	0	1504	0.407	Y	0.529	796	0.769
WB									
NB	TR	266	0	1716	0.155	N	0.392	673	0.395
SB	LT	301	0	1621	0.186	Y	0.392	636	0.473

CYCLE LENGTH : 102.0
LOSS TIME PER CYCLE : 6

SUM OF CRITICAL LANES' FLOW RATIOS : 0.593
INTERSECTION V/C : 0.630

L E V E L   O F   S E R V I C E

APP	LN GR MVM	V/C RATIO	GREEN RATIO	CYC LEN	1st DELAY	LN GR CAP	2nd DELAY	PF	LN GR DELAY	LN GR LOS	APP DELAY	A L
EB	LTR	0.769	0.529	102	14.5	796	3.2	0.85	15.0	B	15.0	
WB												
NB	TR	0.395	0.392	102	16.9	673	0.2	0.85	14.5	B	14.4	
SB	LT	0.473	0.392	102	17.6	636	0.4	0.85	15.3	C	15.2	

INTERSECTION DELAY : 14.9 secs/veh
LEVEL OF SERVICE : B

CASHMAN EXPOAM

'ERSECTION :
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EANS
:KDAY EX AM PEAK 1987 CBD ? N
'UATED SIGNAL

V O L U M E A D J U S T M E N T

'ROACH	LANE GROUP MVM	LANE GROUP VOLUME	FLOW RATE IN GROUP	LANE UTIL FACTOR	ADJ FLOW RATE	PROP OF TURNS LT	PROP OF TURNS RT
	LTR	157	174	1.00	174	0.31	0.22
	LTR	82	91	1.00	91	0.49	0.05
	LTR	58	64	1.00	64	0.45	0.47
	LTR	36	40	1.00	40	0.11	0.61

S A T U R A T I O N F L O W

MVM	IDEAL SAT FLOW	# OF LANES	ADJUSTMENT FACTORS WIDTH	H.V.	GRADE	PARK	BUS	AREA	RT	LT	ADJ. FLOW
LTR	1800	1	1.13	0.99	1.00	1.00	1.00	1.00	0.87	0.97	1699
LTR	1800	1	1.13	0.99	1.00	1.00	1.00	1.00	0.97	0.89	1738
LTR	1800	1	1.00	0.99	1.00	1.00	1.00	1.00	0.84	0.98	1467
LTR	1800	1	0.90	0.99	1.00	1.00	1.00	1.00	0.82	1.00	1315

CASHMAN

EXPOAM

INTERSECTION :
PORTER ST @
ORLEANS
WEEKDAY EX AM PEAK 1987 CBD ? N
ACTUATED SIGNAL

C A P A C I T Y   A N A L Y S I S

APP	LN GR MVM	ADJ FLOW RATE	PMSV LT FLOW	ADJ SAT FLW RT	FLOW RATIO	CRIT ?	GREEN RATIO	LN GR CAPACITY	V/C RATIO
EB	LTR	174	0	1699	0.102	Y	0.548	931	0.187
WB	LTR	91	0	1738	0.052	N	0.548	952	0.096
NB	LTR	64	0	1467	0.044	Y	0.342	502	0.127
SB	LTR	40	0	1315	0.030	N	0.342	450	0.089

CYCLE LENGTH : 73.0
LOSS TIME PER CYCLE : 6

SUM OF CRITICAL LANES' FLOW RATIOS : 0.146
INTERSECTION V/C : 0.159

L E V E L   O F   S E R V I C E

APP	LN GR MVM	V/C RATIO	GREEN RATIO	CYC LEN	1st DELAY	LN GR CAP	2nd DELAY	PF	LN GR DELAY	LN GR LOS	APP DELAY	APP LOS
EB	LTR	0.187	0.548	73	6.3	931	0.0	0.85	5.4	B	5.3	B
WB	LTR	0.096	0.548	73	6.0	952	0.0	0.85	5.1	B	5.0	A
NB	LTR	0.127	0.342	73	12.5	502	0.0	0.85	10.6	B	10.3	B
SB	LTR	0.089	0.342	73	12.4	450	0.0	0.85	10.5	B	10.0	B

INTERSECTION DELAY : 6.6 secs/veh
LEVEL OF SERVICE : B

CASHMAN EXPOPM

INTERSECTION :
PORTER ST @
ORLEANS
WEEKDAY EX PM PEAK 1987 CBD ? N
ACTUATED SIGNAL

2

V O L U M E   A D J U S T M E N T

APPROACH	LANE GROUP MVM	VOLUME	FLOW RATE IN GROUP	LANE UTIL FACTOR	ADJ FLOW RATE	PROP OF TURNS LT	RT
EB	LTR	224	249	1.00	249	0.06	0.18
WB	LTR	89	99	1.00	99	0.37	0.04
NB	LTR	86	96	1.00	96	0.72	0.20
SB	LTR	31	34	1.00	34	0.13	0.65

S A T U R A T I O N   F L O W

APP	MVM	IDEAL SAT FLOW	# OF LANES	WIDTH	H.V.	GRADE	PARK	BUS	AREA	RT	LT	ADJ. FLOW
				ADJUSTMENT FACTORS								
EB	LTR	1800	1	1.13	0.99	1.00	1.00	1.00	1.00	0.89	1.00	1792
WB	LTR	1800	1	1.13	0.99	1.00	1.00	1.00	1.00	0.97	0.86	1680
NB	LTR	1800	1	1.00	0.99	1.00	1.00	1.00	1.00	0.87	0.94	1457
SB	LTR	1800	1	0.90	0.99	1.00	1.00	1.00	1.00	0.81	1.00	1299

CASHMAN EXPOPM

INTERSECTION :
PORTER ST @
ORLEANS
WEEKDAY EX PM PEAK 1987 CBD ? N
ACTUATED SIGNAL

2

C A P A C I T Y   A N A L Y S I S

APP	LN GR MVM	ADJ FLOW RATE	PMSV LT FLOW	ADJ SAT FLW RT	FLOW RATIO	CRIT ?	GREEN RATIO	LN GR CAPACITY	V/C RATIO
EB	LTR	249	0	1792	0.139	Y	0.548	982	0.254
WB	LTR	99	0	1680	0.059	N	0.548	921	0.107
NB	LTR	96	0	1457	0.066	Y	0.342	499	0.192
SB	LTR	34	0	1299	0.026	N	0.342	445	0.076

CYCLE LENGTH : 73.0
LOSS TIME PER CYCLE : 6

SUM OF CRITICAL LANES' FLOW RATIOS : 0.205
INTERSECTION V/C : 0.223

L E V E L   O F   S E R V I C E

APP	LN GR MVM	V/C RATIO	GREEN RATIO	CYC LEN	1st DELAY	LN GR CAP	2nd DELAY	PF	LN GR DELAY	LN GR LOS	APP DELAY	APP LOS
EB	LTR	0.254	0.548	73	6.6	982	0.0	0.85	5.6	B	5.6	B
WB	LTR	0.107	0.548	73	6.0	921	0.0	0.85	5.1	B	5.0	A
NB	LTR	0.192	0.342	73	12.8	499	0.0	0.85	10.9	B	10.7	B
SB	LTR	0.076	0.342	73	12.3	445	0.0	0.85	10.5	B	9.9	B

INTERSECTION DELAY : 6.8 secs/veh
LEVEL OF SERVICE : B

CASHMAN EXSMAM

INTERSECTION :
SUMNER ST. @
SUMNER ST. @
MERIDIAN
WEEKDAY EX AM PEAK 1987 CBD ? N
ACTUATED SIGNAL
3A

V O L U M E   A D J U S T M E N T

APPROACH	LANE GROUP MVM	VOLUME	FLOW RATE IN GROUP	LANE UTIL FACTOR	ADJ FLOW RATE	PROP OF TURNS LT	RT
EB	LT	155	172	1.00	172	0.47	0.00
WB	T	73	81	1.00	81	0.00	0.00
	R	271	301	1.00	301	0.00	1.00
SB	R	10	11	1.00	11	0.00	1.00

S A T U R A T I O N   F L O W

APP	MVM	IDEAL SAT FLOW	# OF LANES	ADJUSTMENT FACTORS WIDTH	H.V.	GRADE	PARK	BUS	AREA	RT	LT	ADJ. FLOW
EB	LT	1800	1	1.13	0.99	1.00	1.00	1.00	1.00	1.00	0.76	1530
WB	T	1800	1	1.13	0.99	1.00	1.00	1.00	1.00	1.00	1.00	2014
	R	1800	1	1.03	0.99	1.00	1.00	1.00	1.00	0.85	1.00	1560
SB	R	1800	1	0.87	0.99	1.00	1.00	1.00	1.00	0.85	1.00	1318

CASHMAN EXSMAM

INTERSECTION :
SUMNER ST. @
SUMNER ST. @
MERIDIAN
WEEKDAY EX AM PEAK 1987 CBD ? N
ACTUATED SIGNAL
?A

C A P A C I T Y   A N A L Y S I S

APP	LN GR MVM	ADJ FLOW RATE	PMSV LT FLOW	ADJ SAT FLW RT	FLOW RATIO	CRIT ?	GREEN RATIO	LN GR CAPACITY	V/C RATIO
EB	LT	172	0	1530	0.112	N	0.286	437	0.394
WB	T	81	0	2014	0.040	N	0.286	575	0.141
	R	301	0	1560	0.193	Y	0.286	446	0.675
SB	R	11	0	1318	0.008	Y	0.357	471	0.023

CYCLE LENGTH : 70.0
LOSS TIME PER CYCLE : 6

SUM OF CRITICAL LANES' FLOW RATIOS : 0.201
INTERSECTION V/C : 0.220

L E V E L   O F   S E R V I C E

APP	LN GR MVM	V/C RATIO	GREEN RATIO	CYC LEN	1st DELAY	LN GR CAP	2nd DELAY	PF	LN GR DELAY	LN GR LOS	APP DELAY	APP LOS
EB	LT	0.394	0.286	70	15.3	437	0.3	0.85	13.3	B	13.1	B
WB	T	0.141	0.286	70	14.1	575	0.0	0.85	12.0	B		
	R	0.675	0.286	70	16.8	446	2.8	0.85	16.7	C	15.7	C
SB	R	0.023	0.357	70	11.1	471	0.0	0.85	9.4	B	8.0	B

INTERSECTION DELAY : 14.7 secs/veh
LEVEL OF SERVICE : B

CASHMAN EXSMPM

INTERSECTION :
SUMNER ST. @
SUMNER ST. @
MERIDIAN
WEEKDAY EX PM PEAK 1987 CBD ? N
ACTUATED SIGNAL

3A

V O L U M E A D J U S T M E N T

APPROACH	LANE GROUP MVM	VOLUME	FLOW RATE IN GROUP	LANE UTIL FACTOR	ADJ FLOW RATE	PROP OF TURNS LT	RT
EB	LT	164	182	1.00	182	0.45	0.00
WB	T	70	78	1.00	78	0.00	0.00
	R	254	282	1.00	282	0.00	1.00
SB	R	10	11	1.00	11	0.00	1.00

S A T U R A T I O N F L O W

APP	MVM	IDEAL SAT FLOW	# OF LANES	ADJUSTMENT FACTORS WIDTH	H.V.	GRADE	PARK	BUS	AREA	RT	LT	ADJ. FLOW
EB	LT	1800	1	1.13	0.99	1.00	1.00	1.00	1.00	1.00	0.79	1591
WB	T	1800	1	1.13	0.99	1.00	1.00	1.00	1.00	1.00	1.00	2014
	R	1800	1	1.03	0.99	1.00	1.00	1.00	1.00	0.85	1.00	1560
SB	R	1800	1	0.87	0.99	1.00	1.00	1.00	1.00	0.85	1.00	1318

CASHMAN EXSMPM

INTERSECTION :
SUMNER ST. @
SUMNER ST. @
MERIDIAN
WEEKDAY EX PM PEAK 1987 CBD ? N
ACTUATED SIGNAL
5A

C A P A C I T Y   A N A L Y S I S

APP	LN GR MVM	ADJ FLOW RATE	PMSV LT FLOW	ADJ SAT FLW RT	FLOW RATIO	CRIT ?	GREEN RATIO	LN GR CAPACITY	V/C RATIO
EB	LT	182	0	1591	0.114	N	0.286	455	0.400
WB	T	78	0	2014	0.039	N	0.286	575	0.136
	R	282	0	1560	0.181	Y	0.286	446	0.632
SB	R	11	0	1318	0.008	Y	0.357	471	0.023

CYCLE LENGTH : 70.0
LOSS TIME PER CYCLE : 6

SUM OF CRITICAL LANES' FLOW RATIOS : 0.189
INTERSECTION V/C : 0.207

L E V E L   O F   S E R V I C E

APP	LN GR MVM	V/C RATIO	GREEN RATIO	CYC LEN	1st DELAY	LN GR CAP	2nd DELAY	PF	LN GR DELAY	LN GR LOS	APP DELAY	APP LOS
EB	LT	0.400	0.286	70	15.3	455	0.3	0.85	13.3	B	13.2	B
WB	T	0.136	0.286	70	14.1	575	0.0	0.85	12.0	B		
	R	0.632	0.286	70	16.6	446	2.0	0.85	15.8	C	14.9	B
SB	R	0.023	0.357	70	11.1	471	0.0	0.85	9.4	B	8.0	B

INTERSECTION DELAY : 14.1 secs/veh
LEVEL OF SERVICE : B

CASHMAN EXSCAM

INTERSECTION :
SUMNER ST. @
SUMNER ST. @
CHELSEA ST.
WEEKDAY EX AM PEAK 1987 CBD ? N
ACTUATED SIGNAL

3b

V O L U M E   A D J U S T M E N T

APPROACH	LANE GROUP MVM	VOLUME	FLOW RATE IN GROUP	LANE UTIL FACTOR	ADJ FLOW RATE	PROP OF TURNS LT	RT
EB	T	82	91	1.00	91	0.00	0.00
WB	T	162	180	1.05	189	0.00	0.00
SB	L	194	216	1.00	216	1.00	0.00
	R	182	202	1.00	202	0.00	1.00

S A T U R A T I O N   F L O W

APP	MVM	IDEAL SAT FLOW	# OF LANES	ADJUSTMENT FACTORS WIDTH	H.V.	GRADE	PARK	BUS	AREA	RT	LT	ADJ. FLOW
EB	T	1800	1	1.13	0.99	1.00	1.00	1.00	1.00	1.00	1.00	2014
WB	T	1800	2	1.08	0.99	1.00	1.00	1.00	1.00	1.00	1.00	3849
SB	L	1800	1	1.13	0.99	1.00	1.00	1.00	1.00	1.00	0.85	1712
	R	1800	1	1.13	0.99	1.00	1.00	1.00	1.00	0.85	1.00	1712

CASHMAN EXSCAM

INTERSECTION :
SUMNER ST. @
SUMNER ST. @
CHELSEA ST.
WEEKDAY EX AM PEAK 1987 CBD ? N
ACTUATED SIGNAL

3b

CAPACITY ANALYSIS

APP	LN GR MVM	ADJ FLOW RATE	PMSV LT FLOW	ADJ SAT FLW RT	FLOW RATIO	CRIT ?	GREEN RATIO	LN GR CAPACITY	V/C RATIO
EB	T	31	0	2014	0.045	N	0.286	575	0.158
WB	T	189	0	3849	0.049	Y	0.286	1100	0.172
SB	L	216	0	1712	0.126	Y	0.357	611	0.354
	R	202	0	1712	0.118	N	0.357	611	0.331

CYCLE LENGTH : 70.0
LOSS TIME PER CYCLE : 6

SUM OF CRITICAL LANES' FLOW RATIOS : 0.175
INTERSECTION V/C : 0.191

LEVEL OF SERVICE

APP	LN GR MVM	V/C RATIO	GREEN RATIO	CYC LEN	1st DELAY	LN GR CAP	2nd DELAY	PF	LN GR DELAY	LN GR LOS	APP DELAY	APP LOS
EB	T	0.158	0.286	70	14.2	575	0.0	0.85	12.1	B	11.8	B
WB	T	0.172	0.286	70	14.3	1100	0.0	0.85	12.2	B	12.1	B
SB	L	0.354	0.357	70	12.6	611	0.2	0.85	10.9	B		
	R	0.331	0.357	70	12.5	611	0.1	0.85	10.7	B	10.8	B

INTERSECTION DELAY : 11.2 secs/veh
LEVEL OF SERVICE : B

CASHMAN EXSCPM

INTERSECTION :
SUMNER ST. @
SUMNER ST. @
CHELSEA ST.
WEEKDAY EX PM PEAK 1987 CBD ? N
ACTUATED SIGNAL

3b

V O L U M E A D J U S T M E N T

APPROACH	LANE MVM	GROUP VOLUME	FLOW RATE IN GROUP	LANE UTIL FACTOR	ADJ FLOW RATE	PROP OF TURNS LT	RT
EB	T	91	101	1.00	101	0.00	0.00
WB	T	109	121	1.05	127	0.00	0.00
SB	L	271	301	1.00	301	1.00	0.00
	R	215	239	1.00	239	0.00	1.00

S A T U R A T I O N F L O W

APP	MVM	IDEAL SAT FLOW	# OF LANES	ADJUSTMENT FACTORS WIDTH	H.V.	GRADE	PARK	BUS	AREA	RT	LT	ADJ. FLOW
EB	T	1800	1	1.13	0.99	1.00	1.00	1.00	1.00	1.00	1.00	2014
WB	T	1800	2	1.08	0.99	1.00	1.00	1.00	1.00	1.00	1.00	3849
SB	L	1800	1	1.13	0.99	1.00	1.00	1.00	1.00	1.00	0.85	1712
	R	1800	1	1.13	0.99	1.00	1.00	1.00	1.00	0.85	1.00	1712

CASHMAN EXSCPM

INTERSECTION :
SUMNER ST. @
SUMNER ST. @
CHELSEA ST.
WEEKDAY EX PM PEAK 1987 CBD ? N
ACTUATED SIGNAL

3b

C A P A C I T Y   A N A L Y S I S

APP	LN GR MVM	ADJ FLOW RATE	PMSV LT FLOW	ADJ SAT FLW RT	FLOW RATIO	CRIT ?	GREEN RATIO	LN GR CAPACITY	V/C RATIO
EB	T	101	0	2014	0.050	Y	0.286	575	0.176
WB	T	127	0	3849	0.033	N	0.286	1100	0.115
SB	L	301	0	1712	0.176	Y	0.357	611	0.493
	R	239	0	1712	0.140	N	0.357	611	0.391

CYCLE LENGTH : 70.0 SUM OF CRITICAL LANES' FLOW RATIOS : 0.226
LOSS TIME PER CYCLE : 6 INTERSECTION V/C : 0.247

L E V E L   O F   S E R V I C E

APP	LN GR MVM	V/C RATIO	GREEN RATIO	CYC LEN	1st DELAY	LN GR CAP	2nd DELAY	PF	LN GR DELAY	LN GR LOS	APP DELAY	APP LOS
EB	T	0.176	0.286	70	14.3	575	0.0	0.85	12.2	B	12.0	B
WB	T	0.115	0.286	70	14.0	1100	0.0	0.85	11.9	B	11.7	B
SB	L	0.493	0.357	70	13.3	611	0.5	0.85	11.7	B		
	R	0.391	0.357	70	12.8	611	0.2	0.85	11.0	B	11.4	B

INTERSECTION DELAY : 11.5 secs/veh
LEVEL OF SERVICE : B

CASHMAN

EXBPAM

INTERSECTION :
PORTER ST. @
PORTER ST. @
BREMAN ST. @
BREMAN ST.
WEEKDAY EX AM PEAK 1987 CBD?N
UNSIGNALIZED
- MAJOR STREET RUNS EAST / WEST

4

UNSIGNALIZED CRITICAL GAPS

APP	CRITICAL GAPS (SEC) LEFT TURN	THROUGH	RIGHT TURN
EB	5.00	---	---
WB	5.00	---	---
NB	6.50	6.00	5.50
SB	6.50	6.00	5.50

VOLUME ALLOCATION TO LANES

APP	LANE 1 L	T	R	LANE 2 L	T	R	LANE 3 L	T	R
EB	46	0	0	0	102	22	0	0	0
WB	7	41	30	0	0	0	0	0	0
NB	2	13	0	0	0	0	0	0	0
SB	75	179	0	0	0	0	0	0	0

UNSIGNALIZED

APP		LANE 1	LANE 2	LANE 3
EB	RESERVE CAPACITY	1071	---	---
	LEVEL OF SERVICE	A		
WB	RESERVE CAPACITY	1052	---	---
	LEVEL OF SERVICE	A		
NB	RESERVE CAPACITY	670	---	---
	LEVEL OF SERVICE	A		
SB	RESERVE CAPACITY	475	---	---
	LEVEL OF SERVICE	A		

MAJOR STREET - EB/WB

INTERSECTION :
PORTER ST. @
PORTER ST. @
BREMAN ST. @
BREMAN ST.
WEEKDAY EX PM PEAK 1987 CBD?N
UNSIGNALIZED
- MAJOR STREET RUNS EAST / WEST

4

U N S I G N A L I Z E D C R I T I C A L G A P S

APP	CRITICAL GAPS (SEC) LEFT TURN	THROUGH	RIGHT TURN
EB	5.00	---	---
WB	5.00	---	---
NB	6.50	6.00	5.50
SB	6.50	6.00	5.50

V O L U M E A L L O C A T I O N T O L A N E S

APP	LANE 1 L	T	R	LANE 2 L	T	R	LANE 3 L	T	R
EB	36	0	0	0	198	28	0	0	0
WB	3	85	44	0	0	0	0	0	0
NB	19	105	10	0	0	0	0	0	0
SB	84	156	0	0	0	0	0	0	0

U N S I G N A L I Z E D

APP		LANE 1	LANE 2	LANE 3
EB	RESERVE CAPACITY	1017	---	---
	LEVEL OF SERVICE	A		
WB	RESERVE CAPACITY	951	---	---
	LEVEL OF SERVICE	A		
NB	RESERVE CAPACITY	451	---	---
	LEVEL OF SERVICE	A		
SB	RESERVE CAPACITY	315	---	---
	LEVEL OF SERVICE	B		

MAJOR STREET - EB/WB

INTERSECTION :
MAVERICK ST. @
MAVERICK ST. @
MERIDIAN ST. @
MERIDIAN ST.
WEEKDAY EX AM PEAK 1987 CBD?N
UNSIGNALIZED
- MAJOR STREET RUNS EAST / WEST

5A

U N S I G N A L I Z E D   C R I T I C A L   G A P S

APP	CRITICAL GAPS (SEC) LEFT TURN	THROUGH	RIGHT TURN
EB	5.00	---	---
WB	5.00	---	---
NB	6.00	5.50	5.00
SB	6.00	5.50	5.00

V O L U M E   A L L O C A T I O N   T O   L A N E S

APP	LANE 1 L	T	R	LANE 2 L	T	R	LANE 3 L	T	R
EB	0	0	10	0	0	0	0	0	0
WB	0	56	0	0	0	206	0	0	0
NB	26	0	0	0	264	73	0	0	0
SB	222	0	23	0	0	0	0	0	0

U N S I G N A L I Z E D

APP		LANE 1	LANE 2	LANE 3
EB	RESERVE CAPACITY	---	---	---
	LEVEL OF SERVICE			
WB	RESERVE CAPACITY	---	---	---
	LEVEL OF SERVICE			
NB	RESERVE CAPACITY	883	539	---
	LEVEL OF SERVICE	A	A	
SB	RESERVE CAPACITY	232	---	---
	LEVEL OF SERVICE	C		

MAJOR STREET - EB/WB

HMM ASSOCIATES 1/1/1980

CASHMAN EXMMPM

INTERSECTION :
MAVERICK ST. @
MAVERICK ST. @
MERIDIAN ST. @
MERIDIAN ST.
WEEKDAY EX PM PEAK 1987 CBD?N
UNSIGNALIZED
- MAJOR STREET RUNS EAST / WEST
5A

U N S I G N A L I Z E D   C R I T I C A L   G A P S

APP	CRITICAL GAPS (SEC) LEFT TURN	THROUGH	RIGHT TURN
EB	5.00	---	---
WB	5.00	---	---
NB	6.00	5.50	5.00
SB	6.00	5.50	5.00

V O L U M E   A L L O C A T I O N   T O   L A N E S

APP	LANE 1 L	T	R	LANE 2 L	T	R	LANE 3 L	T	R
EB	0	0	10	0	0	0	0	0	0
WB	0	41	0	0	0	285	0	0	0
NB	20	0	0	0	245	130	0	0	0
SB	263	0	45	0	0	0	0	0	0

U N S I G N A L I Z E D

APP		LANE 1	LANE 2	LANE 3
EB	RESERVE CAPACITY	---	---	---
	LEVEL OF SERVICE			
WB	RESERVE CAPACITY	---	---	---
	LEVEL OF SERVICE			
NB	RESERVE CAPACITY	869	493	---
	LEVEL OF SERVICE	A	A	
SB	RESERVE CAPACITY	155	---	---
	LEVEL OF SERVICE	D		

MAJOR STREET - EB/WB

INTERSECTION :
MAVERICK ST. @
MAVERICK ST. @
ORLEANS ST. @
ORLEANS ST.
WEEKDAY EX AM PEAK 1987 CBD?N
UNSIGNALIZED
- MAJOR STREET RUNS EAST / WEST

6

U N S I G N A L I Z E D   C R I T I C A L   G A P S

	CRITICAL GAPS (SEC)		
APP	LEFT TURN	THROUGH	RIGHT TURN
EB	5.00	---	---
WB	5.00	---	---
NB	6.50	6.00	5.50
SB	6.50	6.00	5.50

V O L U M E   A L L O C A T I O N   T O   L A N E S

	LANE 1			LANE 2			LANE 3		
APP	L	T	R	L	T	R	L	T	R
EB	0	0	10	0	0	0	0	0	0
WB	23	0	0	0	302	3	0	0	0
NB	50	49	0	0	0	0	0	0	0
SB	0	15	13	0	0	0	0	0	0

U N S I G N A L I Z E D

APP		LANE 1	LANE 2	LANE 3
EB	RESERVE CAPACITY	---	---	---
	LEVEL OF SERVICE			
WB	RESERVE CAPACITY	1165	---	---
	LEVEL OF SERVICE	A		
NB	RESERVE CAPACITY	526	---	---
	LEVEL OF SERVICE	A		
SB	RESERVE CAPACITY	687	---	---
	LEVEL OF SERVICE	A		

MAJOR STREET - EB/WB

INTERSECTION :
MAVERICK ST. @
MAVERICK ST. @
ORLEANS ST. @
ORLEANS ST.
WEEKDAY EX PM PEAK 1987 CBD'N
UNSIGNALIZED
- MAJOR STREET RUNS EAST / WEST

6

UNSIGNALIZED CRITICAL GAPS

APP	CRITICAL GAPS (SEC) LEFT TURN	THROUGH	RIGHT TURN
EB	5.00	---	---
WB	5.00	---	---
NB	6.50	6.00	5.50
SB	6.50	6.00	5.50

VOLUME ALLOCATION TO LANES

APP	LANE 1 L	LANE 1 T	LANE 1 R	LANE 2 L	LANE 2 T	LANE 2 R	LANE 3 L	LANE 3 T	LANE 3 R
EB	0	0	10	0	0	0	0	0	0
WB	27	0	0	0	329	14	0	0	0
NB	27	61	0	0	0	0	0	0	0
SB	0	9	37	0	0	0	0	0	0

UNSIGNALIZED

APP		LANE 1	LANE 2	LANE 3
EB	RESERVE CAPACITY	---	---	---
	LEVEL OF SERVICE			
WB	RESERVE CAPACITY	1161	---	---
	LEVEL OF SERVICE	A		
NB	RESERVE CAPACITY	514	---	---
	LEVEL OF SERVICE	A		
SB	RESERVE CAPACITY	680	---	---
	LEVEL OF SERVICE	A		

MAJOR STREET - EB/WB

CASHMAN EXCTMAM

INTERSECTION :
MAVERICK ST. @
MAVERICK ST. @
COTTAGE ST. @
COTTAGE ST.
WEEKDAY EX AM PEAK 1987 CBD?N
UNSIGNALIZED
- MAJOR STREET RUNS EAST / WEST

7

U N S I G N A L I Z E D   C R I T I C A L   G A P S

APP	CRITICAL GAPS (SEC) LEFT TURN	THROUGH	RIGHT TURN
EB	5.00	---	---
WB	5.00	---	---
NB	6.50	6.00	5.50
SB	6.50	6.00	5.50

V O L U M E   A L L O C A T I O N   T O   L A N E S

APP	LANE 1 L	T	R	LANE 2 L	T	R	LANE 3 L	T	R
EB	0	0	10	0	0	0	0	0	0
WB	17	269	0	0	0	0	0	0	0
NB	0	0	10	0	0	0	0	0	0
SB	0	31	31	0	0	0	0	0	0

U N S I G N A L I Z E D

APP		LANE 1	LANE 2	LANE 3
EB	RESERVE CAPACITY	---	---	---
	LEVEL OF SERVICE			
WB	RESERVE CAPACITY	1171	---	---
	LEVEL OF SERVICE	A		
NB	RESERVE CAPACITY	1083	---	---
	LEVEL OF SERVICE	A		
SB	RESERVE CAPACITY	691	---	---
	LEVEL OF SERVICE	A		

MAJOR STREET - EB/WB

HMM ASSOCIATES 1/1/1980

CASHMAN EXCTMPM

INTERSECTION :
MAVERICK ST. @
MAVERICK ST. @
COTTAGE ST. @
COTTAGE ST.
WEEKDAY EX PM PEAK 1987 CBD^N
UNSIGNALIZED
- MAJOR STREET RUNS EAST / WEST

7

U N S I G N A L I Z E D   C R I T I C A L   G A P S

APP	CRITICAL GAPS (SEC) LEFT TURN	THROUGH	RIGHT TURN
EB	5.00	---	---
WB	5.00	---	---
NB	6.50	6.00	5.50
SB	6.50	6.00	5.50

V O L U M E   A L L O C A T I O N   T O   L A N E S

APP	LANE 1 L	LANE 1 T	LANE 1 R	LANE 2 L	LANE 2 T	LANE 2 R	LANE 3 L	LANE 3 T	LANE 3 R
EB	0	0	10	0	0	0	0	0	0
WB	22	298	0	0	0	0	0	0	0
NB	0	0	10	0	0	0	0	0	0
SB	0	62	48	0	0	0	0	0	0

U N S I G N A L I Z E D

APP		LANE 1	LANE 2	LANE 3
EB	RESERVE CAPACITY	---	---	---
	LEVEL OF SERVICE			
WB	RESERVE CAPACITY	1166	---	---
	LEVEL OF SERVICE	A		
NB	RESERVE CAPACITY	1083	---	---
	LEVEL OF SERVICE	A		
SB	RESERVE CAPACITY	606	---	---
	LEVEL OF SERVICE	A		

MAJOR STREET - EB/WB

HMM ASSOCIATES 1/1/1980

CASHMAN

EXBSAM

INTERSECTION :
SUMNER ST. @
SUMNER ST. @
BREMAN ST. @
BREMAN ST.
WEEKDAY EX AM PEAK 1987 CBD?N
UNSIGNALIZED
- MAJOR STREET RUNS EAST / WEST

8

U N S I G N A L I Z E D C R I T I C A L G A P S

APP	LEFT TURN	THROUGH	RIGHT TURN
	CRITICAL GAPS (SEC)		
EB	5.00	---	---
WB	5.00	---	---
NB	6.50	6.00	5.50
SB	6.50	6.00	5.50

V O L U M E A L L O C A T I O N T O L A N E S

APP	LANE 1 L	T	R	LANE 2 L	T	R	LANE 3 L	T	R
EB	26	216	34	0	0	0	0	0	0
WB	1	39	12	0	0	0	0	0	0
NB	22	44	14	0	0	0	0	0	0
SB	48	15	41	0	0	0	0	0	0

U N S I G N A L I Z E D

APP		LANE 1	LANE 2	LANE 3
EB	RESERVE CAPACITY	1047	---	---
	LEVEL OF SERVICE	A		
WB	RESERVE CAPACITY	929	---	---
	LEVEL OF SERVICE	A		
NB	RESERVE CAPACITY	549	---	---
	LEVEL OF SERVICE	A		
SB	RESERVE CAPACITY	545	---	---
	LEVEL OF SERVICE	A		

MAJOR STREET - EB/WB

INTERSECTION :
SUMNER ST. @
SUMNER ST. @
BREMAN ST. @
BREMAN ST.
WEEKDAY EX PM PEAK 1987 CBD?N
UNSIGNALIZED
- MAJOR STREET RUNS EAST / WEST

8

U N S I G N A L I Z E D   C R I T I C A L   G A P S

APP	LEFT TURN	THROUGH	RIGHT TURN
	---CRITICAL GAPS (SEC)---		
EB	5.00	---	---
WB	5.00	---	---
NB	6.50	6.00	5.50
SB	6.50	6.00	5.50

V O L U M E   A L L O C A T I O N   T O   L A N E S

APP	LANE 1 L	LANE 1 T	LANE 1 R	LANE 2 L	LANE 2 T	LANE 2 R	LANE 3 L	LANE 3 T	LANE 3 R
EB	23	309	29	0	0	0	0	0	0
WB	1	72	12	0	0	0	0	0	0
NB	21	47	31	0	0	0	0	0	0
SB	80	8	15	0	0	0	0	0	0

U N S I G N A L I Z E D

APP		LANE 1	LANE 2	LANE 3
EB	RESERVE CAPACITY	1080	---	---
	LEVEL OF SERVICE	A		
WB	RESERVE CAPACITY	846	---	---
	LEVEL OF SERVICE	A		
NB	RESERVE CAPACITY	519	---	---
	LEVEL OF SERVICE	A		
SB	RESERVE CAPACITY	391	---	---
	LEVEL OF SERVICE	B		

MAJOR STREET - EB/WB

INTERSECTION :
SUMNER @
ORLEANS
WEEKDAY EXISTING AM 1987 CBD'N
UNSIGNALIZED
- MAJOR STREET RUNS EAST / WEST
*9E

U N S I G N A L I Z E D   C R I T I C A L   G A P S

APP	LEFT TURN	THROUGH	RIGHT TURN
	CRITICAL GAPS (SEC)		
EB	5.00	---	---
WB	5.00	---	---
NB	6.00	5.50	5.00
SB	6.00	5.50	5.00

V O L U M E   A L L O C A T I O N   T O   L A N E S

APP	LANE 1			LANE 2			LANE 3		
	L	T	R	L	T	R	L	T	R
EB	50	165	23	0	0	0	0	0	0
WB	0	0	10	0	0	0	0	0	0
NB	113	65	14	0	0	0	0	0	0
SB	27	0	4	0	0	0	0	0	0

U N S I G N A L I Z E D

APP		LANE 1	LANE 2	LANE 3
EB	RESERVE CAPACITY	1137	---	---
	LEVEL OF SERVICE	A		
WB	RESERVE CAPACITY	---	---	---
	LEVEL OF SERVICE			
NB	RESERVE CAPACITY	593	---	---
	LEVEL OF SERVICE	A		
SB	RESERVE CAPACITY	653	---	---
	LEVEL OF SERVICE	A		

MAJOR STREET - EB/WB

INTERSECTION :
SUMNER @
ORLEANS
WEEKDAY EXISTING PM 1987 CBD?N
UNSIGNALIZED
- MAJOR STREET RUNS EAST / WEST
#9

UNSIGNALIZED CRITICAL GAPS

APP	CRITICAL GAPS (SEC) LEFT TURN	THROUGH	RIGHT TURN
EB	5.00	---	---
WB	5.00	---	---
NB	6.00	5.50	5.00
SB	6.00	5.50	5.00

VOLUME ALLOCATION TO LANES

APP	LANE 1 L	T	R	LANE 2 L	T	R	LANE 3 L	T	R
EB	75	314	30	0	0	0	0	0	0
WB	0	0	10	0	0	0	0	0	0
NB	85	56	33	0	0	0	0	0	0
SB	9	10	9	0	0	0	0	0	0

UNSIGNALIZED

APP		LANE 1	LANE 2	LANE 3
EB	RESERVE CAPACITY	1112	---	---
	LEVEL OF SERVICE	A		
WB	RESERVE CAPACITY	---	---	---
	LEVEL OF SERVICE			
NB	RESERVE CAPACITY	466	---	---
	LEVEL OF SERVICE	A		
SB	RESERVE CAPACITY	651	---	---
	LEVEL OF SERVICE	A		

MAJOR STREET - EB/WB

INTERSECTION :
SUMNER ST. @
SUMNER ST. @
COTTAGE ST. @
COTTAGE ST.
WEEKDAY EX AM PEAK 1987 CBD?N
UNSIGNALIZED
- MAJOR STREET RUNS EAST / WEST
10

U N S I G N A L I Z E D C R I T I C A L G A P S

APP	LEFT TURN	THROUGH	RIGHT TURN
	CRITICAL GAPS (SEC)		
EB	5.00	---	---
WB	5.00	---	---
NB	6.50	6.00	5.50
SB	6.50	6.00	5.50

V O L U M E A L L O C A T I O N T O L A N E S

APP	LANE 1 L	LANE 1 T	LANE 1 R	LANE 2 L	LANE 2 T	LANE 2 R	LANE 3 L	LANE 3 T	LANE 3 R
EB	0	182	46	0	0	0	0	0	0
WB	0	0	10	0	0	0	0	0	0
NB	0	0	10	0	0	0	0	0	0
SB	19	20	0	0	0	0	0	0	0

U N S I G N A L I Z E D

APP		LANE 1	LANE 2	LANE 3
EB	RESERVE CAPACITY	---	---	---
	LEVEL OF SERVICE			
WB	RESERVE CAPACITY	---	---	---
	LEVEL OF SERVICE			
NB	RESERVE CAPACITY	864	---	---
	LEVEL OF SERVICE	A		
SB	RESERVE CAPACITY	685	---	---
	LEVEL OF SERVICE	A		

MAJOR STREET - EB/WB

INTERSECTION :
SUMNER ST. @
SUMNER ST. @
COTTAGE ST. @
COTTAGE ST.
WEEKDAY EX PM PEAK 1987 CBD?N
UNSIGNALIZED
- MAJOR STREET RUNS EAST / WEST
10

U N S I G N A L I Z E D   C R I T I C A L   G A P S

APP	CRITICAL GAPS (SEC) LEFT TURN	THROUGH	RIGHT TURN
EB	5.00	---	---
WB	5.00	---	---
NB	6.50	6.00	5.50
SB	6.50	6.00	5.50

V O L U M E   A L L O C A T I O N   T O   L A N E S

APP	LANE 1 L	T	R	LANE 2 L	T	R	LANE 3 L	T	R
EB	0	303	53	0	0	0	0	0	0
WB	0	0	10	0	0	0	0	0	0
NB	0	0	10	0	0	0	0	0	0
SB	22	27	0	0	0	0	0	0	0

U N S I G N A L I Z E D

APP		LANE 1	LANE 2	LANE 3
EB	RESERVE CAPACITY	---	---	---
	LEVEL OF SERVICE			
WB	RESERVE CAPACITY	---	---	---
	LEVEL OF SERVICE			
NB	RESERVE CAPACITY	749	---	---
	LEVEL OF SERVICE	A		
SB	RESERVE CAPACITY	568	---	---
	LEVEL OF SERVICE	A		

MAJOR STREET - EB/WB

1990 NO-BUILD AM AND PM PEAK HOUR OPERATIONS

CASHMAN LINFAM1

INTERSECTION :
PORTER @
CHELSEA
WEEKDAY NB AM PEAK 1990 CBD ? N
ACTUATED SIGNAL

1

V O L U M E   A D J U S T M E N T

APPROACH	LANE GROUP MVM	VOLUME	FLOW RATE IN GROUP	LANE UTIL FACTOR	ADJ FLOW RATE	PROP OF TURNS LT	RT
EB	LTR	392	436	1.00	436	0.37	0.22
WB							
NB	TR	181	201	1.00	201	0.00	0.09
SB	LT	124	138	1.00	138	0.19	0.00

S A T U R A T I O N   F L O W

APP	MVM	IDEAL SAT FLOW	# OF LANES	WIDTH	H.V.	GRADE	PARK	BUS	AREA	RT	LT	ADJ. FLOW
				ADJUSTMENT FACTORS								
EB	LTR	1800	1	1.13	0.99	1.00	1.00	1.00	1.00	0.87	0.85	1489
WB												
NB	TR	1800	1	1.07	0.99	1.00	1.00	1.00	1.00	0.94	1.00	1792
SB	LT	1800	1	1.07	0.99	1.00	1.00	1.00	1.00	1.00	0.91	1735

INTERSECTION :
PORTER 3
CHELSEA
WEEKDAY NB AM PEAK 1990 CBD ? N
ACTUATED SIGNAL

C A P A C I T Y   A N A L Y S I S

APP	LN GR MVM	ADJ FLOW RATE	PMSV LT FLOW	ADJ SAT FLW RT	FLOW RATIO	CRIT ?	GREEN RATIO	LN GR CAPACITY	V/C RATIO
EB	LTR	436	0	1489	0.293	Y	0.529	788	0.553
WB									
NB	TR	201	0	1792	0.112	Y	0.392	703	0.286
SB	LT	138	0	1735	0.080	N	0.392	680	0.203

CYCLE LENGTH : 102.0
LOSS TIME PER CYCLE : 6

SUM OF CRITICAL LANES' FLOW RATIOS : 0.405
INTERSECTION V/C : 0.430

L E V E L   O F   S E R V I C E

APP	LN GR MVM	V/C RATIO	GREEN RATIO	CYC LEN	1st DELAY	LN GR CAP	2nd DELAY	PF	LN GR DELAY	LN GR LOS	APP DELAY	AP LO
EB	LTR	0.553	0.529	102	12.1	788	0.7	0.85	10.9	B	10.9	B
WB												
NB	TR	0.286	0.392	102	16.1	703	0.1	0.85	13.8	B	13.7	B
SB	LT	0.203	0.392	102	15.6	680	0.0	0.85	13.3	B	13.1	B

INTERSECTION DELAY : 12.0 secs/veh
LEVEL OF SERVICE : B

CASHMAN LINPEM1

INTERSECTION :
PORTER @
CHELSEA
WEEKDAY NB PM PEAK 1990 CBD [illegible] N
ACTUATED SIGNAL

V O L U M E   A D J U S T M E N T

APPROACH	LANE MVM	GROUP VOLUME	FLOW RATE IN GROUP	LANE UTIL FACTOR	ADJ FLOW RATE	PROP OF TURNS LT	PROP OF TURNS RT
EB	LTR	609	677	1.00	677	0.51	0.18
WB							
NB	TR	270	300	1.00	300	0.00	0.14
SB	LT	300	333	1.00	333	0.23	0.00

S A T U R A T I O N   F L O W

APP	MVM	IDEAL SAT FLOW	# OF LANES	ADJUSTMENT FACTORS: WIDTH	H.V.	GRADE	PARK	BUS	AREA	RT	LT	ADJ. FLOW
EB	LTR	1800	1	1.13	0.99	1.00	1.00	1.00	1.00	0.89	0.83	1487
WB												
NB	TR	1800	1	1.07	0.99	1.00	1.00	1.00	1.00	0.91	1.00	1735
SB	LT	1800	1	1.07	0.99	1.00	1.00	1.00	1.00	1.00	0.80	1525

INTERSECTION :
PORTER D
CHELSEA
WEEKDAY NB PM PEAK 1990 CBD ? N
ACTUATED SIGNAL

C A P A C I T Y A N A L Y S I S

APP	LN GR MVM	ADJ FLOW RATE	PMSV LT FLOW	ADJ SAT FLW RT	FLOW RATIO	CRIT ?	GREEN RATIO	LN GR CAPACITY	V/C RATIO
EB	LTR	677	0	1487	0.455	Y	0.529	787	0.860
WB									
NB	TR	300	0	1735	0.173	N	0.392	680	0.441
SB	LT	333	0	1525	0.218	Y	0.392	598	0.557

CYCLE LENGTH : 102.0
LOSS TIME PER CYCLE : 6

SUM OF CRITICAL LANES' FLOW RATIOS : 0.673
INTERSECTION V/C : 0.715

L E V E L O F S E R V I C E

APP	LN GR MVM	V/C RATIO	GREEN RATIO	CYC LEN	1st DELAY	LN GR CAP	2nd DELAY	PF	LN GR DELAY	LN GR LOS	APP DELAY	AP LO
EB	LTR	0.860	0.529	102	15.8	787	6.7	0.85	19.1	C	19.0	C
WB												
NB	TR	0.441	0.392	102	17.3	680	0.3	0.85	15.0	B	14.9	B
SB	LT	0.557	0.392	102	18.3	598	0.9	0.85	16.3	C	16.2	C

INTERSECTION DELAY : 17.3 secs/veh
LEVEL OF SERVICE : C

CASHMAN LINRAM

INTERSECTION :
PORTER @
ORLEANS
WEEKDAY NB AM PEAK 1990 CBD ? N
ACTUATED SIGNAL

2

V O L U M E   A D J U S T M E N T

APPROACH	LANE MVM	GROUP VOLUME	FLOW RATE IN GROUP	LANE UTIL FACTOR	ADJ FLOW RATE	PROP OF TURNS LT	RT
EB	LTR	180	200	1.00	200	0.29	0.28
WB	LTR	86	96	1.00	96	0.49	0.05
NB	LTR	78	87	1.00	87	0.56	0.37
SB	LTR	38	42	1.00	42	0.11	0.61

S A T U R A T I O N   F L O W

APP	MVM	IDEAL SAT FLOW	# OF LANES	ADJUSTMENT FACTORS WIDTH	H.V.	GRADE	PARK	BUS	AREA	RT	LT	ADJ. FLOW
EB	LTR	1800	1	1.13	0.99	1.00	1.00	1.00	1.00	0.86	0.97	1680
WB	LTR	1800	1	1.13	0.99	1.00	1.00	1.00	1.00	0.97	0.87	1699
NB	LTR	1800	1	1.00	0.99	1.00	1.00	1.00	1.00	0.85	0.96	1454
SB	LTR	1800	1	0.90	0.99	1.00	1.00	1.00	1.00	0.82	1.00	1315

INTERSECTION :
PORTER 3
ORLEANS
WEEKDAY NB AM PEAK 1990 CBD ? N
ACTUATED SIGNAL

2

C A P A C I T Y   A N A L Y S I S

APP	LN GR MVM	ADJ FLOW RATE	PMSV LT FLOW	ADJ SAT FLW RT	FLOW RATIO	CRIT ?	GREEN RATIO	LN GR CAPACITY	V/C RATIO
EB	LTR	200	0	1680	0.119	Y	0.548	921	0.217
WB	LTR	96	0	1699	0.057	N	0.548	931	0.103
NB	LTR	87	0	1454	0.060	Y	0.342	498	0.175
SB	LTR	42	0	1315	0.032	N	0.342	450	0.093

CYCLE LENGTH : 73.0
LOSS TIME PER CYCLE : 6

SUM OF CRITICAL LANES' FLOW RATIOS : 0.179
INTERSECTION V/C : 0.195

L E V E L   O F   S E R V I C E

APP	LN GR MVM	V/C RATIO	GREEN RATIO	CYC LEN	1st DELAY	LN GR CAP	2nd DELAY	PF	LN GR DELAY	LN GR LOS	APP DELAY	AP LO
EB	LTR	0.217	0.548	73	6.4	921	0.0	0.85	5.4	B	5.3	B
WB	LTR	0.103	0.548	73	6.0	931	0.0	0.85	5.1	B	5.0	A
NB	LTR	0.175	0.342	73	12.8	498	0.0	0.85	10.9	B	10.7	B
SB	LTR	0.093	0.342	73	12.4	450	0.0	0.85	10.5	B	10.0	B

INTERSECTION DELAY : 6.8 secs/veh
LEVEL OF SERVICE : B

CASHMAN

INTERSECTION :
PORTER @
ORLEANS
WEEKDAY NB PM PEAK 1990 CBD ? N
ACTUATED SIGNAL

2

V O L U M E   A D J U S T M E N T

APPROACH	LANE MVM	GROUP VOLUME	FLOW RATE IN GROUP	LANE UTIL FACTOR	ADJ FLOW RATE	PROP OF TURNS LT	RT
EB	LTR	250	278	1.00	278	0.06	0.22
WB	LTR	94	104	1.00	104	0.37	0.04
NB	LTR	100	111	1.00	111	0.75	0.18
SB	LTR	32	36	1.00	36	0.12	0.65

S A T U R A T I O N   F L O W

APP	MVM	IDEAL SAT FLOW	# OF LANES	ADJUSTMENT FACTORS WIDTH	H.V.	GRADE	PARK	BUS	AREA	RT	LT	ADJ. FLOW
EB	LTR	1800	1	1.13	0.99	1.00	1.00	1.00	1.00	0.87	1.00	1752
WB	LTR	1800	1	1.13	0.99	1.00	1.00	1.00	1.00	0.97	0.84	1641
NB	LTR	1800	1	1.00	0.99	1.00	1.00	1.00	1.00	0.89	0.93	1475
SB	LTR	1800	1	0.90	0.99	1.00	1.00	1.00	1.00	0.81	1.00	1299

CASHMAN LINBPM

INTERSECTION :
PORTER D
ORLEANS
WEEKDAY NB PM PEAK 1990 CBD ? N
ACTUATED SIGNAL

2

C A P A C I T Y A N A L Y S I S

APP	LN GR MVM	ADJ FLOW RATE	PMSV LT FLOW	ADJ SAT FLW RT	FLOW RATIO	CRIT ?	GREEN RATIO	LN GR CAPACITY	V/C RATIO
EB	LTR	278	0	1752	0.159	Y	0.548	960	0.290
WB	LTR	104	0	1641	0.063	N	0.548	899	0.116
NB	LTR	111	0	1475	0.075	Y	0.342	505	0.220
SB	LTR	36	0	1299	0.028	N	0.342	445	0.081

CYCLE LENGTH : 73.0
LOSS TIME PER CYCLE : 6

SUM OF CRITICAL LANES' FLOW RATIOS : 0.234
INTERSECTION V/C : 0.255

L E V E L O F S E R V I C E

APP	LN GR MVM	V/C RATIO	GREEN RATIO	CYC LEN	1st DELAY	LN GR CAP	2nd DELAY	PF	LN GR DELAY	LN GR LOS	APP DELAY	APP LOS
EB	LTR	0.290	0.548	73	6.7	960	0.0	0.85	5.7	B	5.7	B
WB	LTR	0.116	0.548	73	6.1	899	0.0	0.85	5.2	B	5.1	B
NB	LTR	0.220	0.342	73	13.0	505	0.0	0.85	11.0	B	10.8	B
SB	LTR	0.081	0.342	73	12.3	445	0.0	0.85	10.5	B	9.9	B

INTERSECTION DELAY : 7.0 secs/veh
LEVEL OF SERVICE : B

CASHMAN [illegible]

INTERSECTION :
SUMNER @
MERIDIAN
WEEKDAY NB AM PEAK 1990 CBD ? N
ACTUATED SIGNAL

34

V O L U M E A D J U S T M E N T

APPROACH	LANE GROUP MVM	VOLUME	FLOW RATE IN GROUP	LANE UTIL FACTOR	ADJ FLOW RATE	PROP OF TURNS LT	RT
EB	LT	194	216	1.00	216	0.55	0.00
WB	T	82	91	1.00	91	0.00	0.00
	R	301	334	1.00	334	0.00	1.00
SB	R	10	11	1.00	11	0.00	1.00

S A T U R A T I O N F L O W

APP	MVM	IDEAL SAT FLOW	# OF LANES	WIDTH	H.V.	GRADE	PARK	BUS	AREA	RT	LT	ADJ. FLOW
				ADJUSTMENT FACTORS								
EB	LT	1800	1	1.13	0.99	1.00	1.00	1.00	1.00	1.00	0.68	1369
WB	T	1800	1	1.13	0.99	1.00	1.00	1.00	1.00	1.00	1.00	2014
	R	1800	1	1.03	0.99	1.00	1.00	1.00	1.00	0.85	1.00	1560
SB	R	1800	1	0.87	0.99	1.00	1.00	1.00	1.00	0.85	1.00	1318

INTERSECTION :
SUMNER ?
MERIDIAN
WEEKDAY NB AM PEAK 1990 CBD ? N
ACTUATED SIGNAL
3A

C A P A C I T Y   A N A L Y S I S

APP	LN GR MVM	ADJ FLOW RATE	PMSV LT FLOW	ADJ SAT FLW RT	FLOW RATIO	CRIT ?	GREEN RATIO	LN GR CAPACITY	V/C RATIO
EB	LT	216	0	1369	0.158	N	0.286	391	0.552
WB	T	91	0	2014	0.045	N	0.286	575	0.158
	R	334	0	1560	0.214	Y	0.286	446	0.749
SB	R	11	0	1318	0.008	Y	0.357	471	0.023

CYCLE LENGTH : 70.0
LOSS TIME PER CYCLE : 6
SUM OF CRITICAL LANES' FLOW RATIOS : 0.222
INTERSECTION V/C : 0.243

L E V E L   O F   S E R V I C E

APP	LN GR MVM	V/C RATIO	GREEN RATIO	CYC LEN	1st DELAY	LN GR CAP	2nd DELAY	PF	LN GR DELAY	LN GR LOS	APP DELAY	APP LOS
EB	LT	0.552	0.286	70	16.1	391	1.3	0.85	14.8	B	14.7	B
WB	T	0.158	0.286	70	14.2	575	0.0	0.85	12.1	B		
	R	0.749	0.286	70	17.3	446	4.7	0.85	18.7	C	17.2	C
SB	R	0.023	0.357	70	11.1	471	0.0	0.85	9.4	B	8.0	B

INTERSECTION DELAY : 16.1 secs/veh
LEVEL OF SERVICE : C

CASHMAN LTANPFM

INTERSECTION :
SUMNER &
MERIDIAN
WEEKDAY NB PM PEAK 1990 CBD ? N
ACTUATED SIGNAL

3A

V O L U M E   A D J U S T M E N T

APPROACH	LANE MVM	GROUP VOLUME	FLOW RATE IN GROUP	LANE UTIL FACTOR	ADJ FLOW RATE	PROP OF TURNS LT	RT
EB	LT	186	207	1.00	207	0.48	0.00
WB	T	85	94	1.00	94	0.00	0.00
	R	283	314	1.00	314	0.00	1.00
SB	R	10	11	1.00	11	0.00	1.00

S A T U R A T I O N   F L O W

APP	MVM	IDEAL SAT FLOW	# OF LANES	ADJUSTMENT FACTORS WIDTH	H.V.	GRADE	PARK	BUS	AREA	RT	LT	ADJ. FLOW
EB	LT	1800	1	1.13	0.99	1.00	1.00	1.00	1.00	1.00	0.73	1470
WB	T	1800	1	1.13	0.99	1.00	1.00	1.00	1.00	1.00	1.00	2014
	R	1800	1	1.03	0.99	1.00	1.00	1.00	1.00	0.85	1.00	1560
SB	R	1800	1	0.87	0.99	1.00	1.00	1.00	1.00	0.85	1.00	1318

CASHMAN LTANBR

INTERSECTION :
SUMNER @
MERIDIAN
WEEKDAY NB PM PEAK 1990 CBD ? N
ACTUATED SIGNAL

3A

C A P A C I T Y   A N A L Y S I S

APP	LN GR MVM	ADJ FLOW RATE	PMSV LT FLOW	ADJ SAT FLW RT	FLOW RATIO	CRIT ?	GREEN RATIO	LN GR CAPACITY	V/C RATIO
EB	LT	207	0	1470	0.141	N	0.286	420	0.493
WB	T	94	0	2014	0.047	N	0.286	575	0.163
	R	314	0	1560	0.201	Y	0.286	446	0.704
SB	R	11	0	1318	0.008	Y	0.357	471	0.023

CYCLE LENGTH : 70.0
LOSS TIME PER CYCLE : 6

SUM OF CRITICAL LANES' FLOW RATIOS : 0.209
INTERSECTION V/C : 0.229

L E V E L   O F   S E R V I C E

APP	LN GR MVM	V/C RATIO	GREEN RATIO	CYC LEN	1st DELAY	LN GR CAP	2nd DELAY	PF	LN GR DELAY	LN GR LOS	APP DELAY	AP LO
EB	LT	0.493	0.286	70	15.8	420	0.8	0.85	14.1	B	14.0	B
WB	T	0.163	0.286	70	14.2	575	0.0	0.85	12.1	B		
	R	0.704	0.286	70	17.0	446	3.4	0.85	17.3	C	16.1	C
SB	R	0.023	0.357	70	11.1	471	0.0	0.85	9.4	B	8.0	B

INTERSECTION DELAY : 15.2 secs/veh
LEVEL OF SERVICE : C

CASHMAN LIBNBAM

INTERSECTION :
SUMNER Ə
CHELSEA
WEEKDAY NB AM PEAK 1990 CBD ? N
ACTUATED SIGNAL

38

V O L U M E   A D J U S T M E N T

APPROACH	LANE MVM	GROUP VOLUME	FLOW RATE IN GROUP	LANE UTIL FACTOR	ADJ FLOW RATE	PROP OF TURNS LT	RT
EB	T	87	97	1.00	97	0.00	0.00
WB	T	183	203	1.05	213	0.00	0.00
SB	L	243	270	1.00	270	1.00	0.00
	R	197	219	1.00	219	0.00	1.00

S A T U R A T I O N   F L O W

APP	MVM	IDEAL SAT FLOW	# OF LANES	ADJUSTMENT FACTORS WIDTH	H.V.	GRADE	PARK	BUS	AREA	RT	LT	ADJ. FLOW
EB	T	1800	1	1.13	0.99	1.00	1.00	1.00	1.00	1.00	1.00	2014
WB	T	1800	2	1.08	0.99	1.00	1.00	1.00	1.00	1.00	1.00	3849
SB	L	1800	1	1.13	0.99	1.00	1.00	1.00	1.00	1.00	0.85	1712
	R	1800	1	1.13	0.99	1.00	1.00	1.00	1.00	0.85	1.00	1712

CASHMAN LIBNB

INTERSECTION :
SUMNER D
CHELSEA
WEEKDAY NB AM PEAK 1990 CBD ? N
ACTUATED SIGNAL

3B

C A P A C I T Y   A N A L Y S I S

APP	LN GR MVM	ADJ FLOW RATE	PMSV LT FLOW	ADJ SAT FLW RT	FLOW RATIO	CRIT ?	GREEN RATIO	LN GR CAPACITY	V/C RATIO
EB	T	97	0	2014	0.048	N	0.286	575	0.169
WB	T	213	0	3849	0.055	Y	0.286	1100	0.194
SB	L	270	0	1712	0.158	Y	0.357	611	0.442
	R	219	0	1712	0.128	N	0.357	611	0.358

CYCLE LENGTH : 70.0 SUM OF CRITICAL LANES' FLOW RATIOS : 0.213
LOSS TIME PER CYCLE : 6 INTERSECTION V/C : 0.233

L E V E L   O F   S E R V I C E

APP	LN GR MVM	V/C RATIO	GREEN RATIO	CYC LEN	1st DELAY	LN GR CAP	2nd DELAY	PF	LN GR DELAY	LN GR LOS	APP DELAY	AP LO
EB	T	0.169	0.286	70	14.3	575	0.0	0.85	12.2	B	12.0	[illegible]
WB	T	0.194	0.286	70	14.4	1100	0.0	0.85	12.2	B	12.1	[illegible]
SB	L	0.442	0.357	70	13.1	611	0.3	0.85	11.4	B		
	R	0.358	0.357	70	12.6	611	0.2	0.85	10.9	B	11.2	[illegible]

INTERSECTION DELAY : 11.5 secs/veh
LEVEL OF SERVICE : B

CASHMAN LIBNPFM

INTERSECTION :
SUMNER @
CHELSEA
WEEKDAY NB PM PEAK 1990 CBD ? N
ACTUATED SIGNAL
3b

V O L U M E   A D J U S T M E N T

APPROACH	LANE MVM	GROUP VOLUME	FLOW RATE IN GROUP	LANE UTIL FACTOR	ADJ FLOW RATE	PROP OF TURNS LT	RT
EB	T	97	108	1.00	108	0.00	0.00
WB	T	129	143	1.05	150	0.00	0.00
SB	L	325	361	1.00	361	1.00	0.00
	R	239	266	1.00	266	0.00	1.00

S A T U R A T I O N   F L O W

		IDEAL	# OF	ADJUSTMENT FACTORS								ADJ.
APP	MVM	SAT FLOW	LANES	WIDTH	H.V.	GRADE	PARK	BUS	AREA	RT	LT	FLOW
EB	T	1800	1	1.13	0.99	1.00	1.00	1.00	1.00	1.00	1.00	2014
WB	T	1800	2	1.08	0.99	1.00	1.00	1.00	1.00	1.00	1.00	3849
SB	L	1800	1	1.13	0.99	1.00	1.00	1.00	1.00	1.00	0.85	1712
	R	1800	1	1.13	0.99	1.00	1.00	1.00	1.00	0.85	1.00	1712

CASHMAN L?BN

INTERSECTION :
SUMNER @
CHELSEA
WEEKDAY NB PM PEAK 1990 CBD ? N
ACTUATED SIGNAL

3b

C A P A C I T Y   A N A L Y S I S

APP	LN GR MVM	ADJ FLOW RATE	PMSV LT FLOW	ADJ SAT FLW RT	FLOW RATIO	CRIT ?	GREEN RATIO	LN GR CAPACITY	V/C RATIO
EB	T	108	0	2014	0.054	Y	0.286	575	0.188
WB	T	150	0	3849	0.039	N	0.286	1100	0.136
SB	L	361	0	1712	0.211	Y	0.357	611	0.591
	R	266	0	1712	0.155	N	0.357	611	0.435

CYCLE LENGTH : 70.0
LOSS TIME PER CYCLE : 6

SUM OF CRITICAL LANES' FLOW RATIOS : 0.265
INTERSECTION V/C : 0.290

L E V E L   O F   S E R V I C E

APP	LN GR MVM	V/C RATIO	GREEN RATIO	CYC LEN	1st DELAY	LN GR CAP	2nd DELAY	PF	LN GR DELAY	LN GR LOS	APP DELAY	A L
EB	T	0.188	0.286	70	14.3	575	0.0	0.85	12.2	B	12.0	
WB	T	0.136	0.286	70	14.1	1100	0.0	0.85	12.0	B	11.8	
SB	L	0.591	0.357	70	13.9	611	1.1	0.85	12.7	B		
	R	0.435	0.357	70	13.0	611	0.3	0.85	11.3	B	12.1	

INTERSECTION DELAY : 12.0 secs/veh
LEVEL OF SERVICE : B

INTERSECTION :
PORTER @
BREMAN
WEEKDAY NB AM PEAK 1990 CBD'N
UNSIGNALIZED
- MAJOR STREET RUNS EAST / WEST
4

U N S I G N A L I Z E D   C R I T I C A L   G A P S

APP	LEFT TURN	THROUGH	RIGHT TURN
	CRITICAL GAPS (SEC)		
EB	5.00	---	---
WB	5.00	---	---
NB	6.50	6.00	5.50
SB	6.50	6.00	5.50

V O L U M E   A L L O C A T I O N   T O   L A N E S

APP	LANE 1 L	LANE 1 T	LANE 1 R	LANE 2 L	LANE 2 T	LANE 2 R	LANE 3 L	LANE 3 T	LANE 3 R
EB	49	0	0	0	122	29	0	0	0
WB	7	44	47	0	0	0	0	0	0
NB	2	25	0	0	0	0	0	0	0
SB	80	196	0	0	0	0	0	0	0

U N S I G N A L I Z E D

APP		LANE 1	LANE 2	LANE 3
EB	RESERVE CAPACITY	1046	---	---
	LEVEL OF SERVICE	A		
WB	RESERVE CAPACITY	1023	---	---
	LEVEL OF SERVICE	A		
NB	RESERVE CAPACITY	638	---	---
	LEVEL OF SERVICE	A		
SB	RESERVE CAPACITY	410	---	---
	LEVEL OF SERVICE	A		

MAJOR STREET - EB/WB

INTERSECTION :
PORTER D
BREMAN
WEEKDAY NB PM PEAK 1990 CRD'N
UNSIGNALIZED
- MAJOR STREET RUNS EAST / WEST

4

U N S I G N A L I Z E D   C R I T I C A L   G A P S

APP	CRITICAL GAPS (SEC) LEFT TURN	THROUGH	RIGHT TURN
EB	5.00	---	---
WB	5.00	---	---
NB	6.50	6.00	5.50
SB	6.50	6.00	5.50

V O L U M E   A L L O C A T I O N   T O   L A N E S

APP	LANE 1 L	T	R	LANE 2 L	T	R	LANE 3 L	T	R
EB	38	0	0	0	221	35	0	0	0
WB	3	90	53	0	0	0	0	0	0
NB	20	123	11	0	0	0	0	0	0
SB	94	172	0	0	0	0	0	0	0

U N S I G N A L I Z E D

APP		LANE 1	LANE 2	LANE 3
EB	RESERVE CAPACITY	1000	---	---
	LEVEL OF SERVICE	A		
WB	RESERVE CAPACITY	921	---	---
	LEVEL OF SERVICE	A		
NB	RESERVE CAPACITY	395	---	---
	LEVEL OF SERVICE	B		
SB	RESERVE CAPACITY	246	---	---
	LEVEL OF SERVICE	C		

MAJOR STREET - EB/WB

INTERSECTION :
MAVERICK &
MERIDIAN
WEEKDAY NB AM PEAK 1990 CBD"N
UNSIGNALIZED
- MAJOR STREET RUNS EAST / WEST
5A

U N S I G N A L I Z E D   C R I T I C A L   G A P S

APP	LEFT TURN	THROUGH	RIGHT TURN
	CRITICAL GAPS (SEC)		
EB	5.00	---	---
WB	5.00	---	---
NB	6.00	5.50	5.00
SB	6.00	5.50	5.00

V O L U M E   A L L O C A T I O N   T O   L A N E S

APP	LANE 1 L	LANE 1 T	LANE 1 R	LANE 2 L	LANE 2 T	LANE 2 R	LANE 3 L	LANE 3 T	LANE 3 R
EB	0	1	0	0	0	0	0	0	0
WB	0	59	0	0	0	221	0	0	0
NB	28	0	0	0	321	77	0	0	0
SB	258	0	24	0	0	0	0	0	0

U N S I G N A L I Z E D

APP		LANE 1	LANE 2	LANE 3
EB	RESERVE CAPACITY	---	---	---
	LEVEL OF SERVICE			
WB	RESERVE CAPACITY	---	---	---
	LEVEL OF SERVICE			
NB	RESERVE CAPACITY	875	454	---
	LEVEL OF SERVICE	A	A	
SB	RESERVE CAPACITY	119	---	---
	LEVEL OF SERVICE	D		

MAJOR STREET - EB/WB

INTERSECTION :
MAVERICK @
MERIDIAN
WEEKDAY NB PM PEAK 1990 CBD^N
UNSIGNALIZED
- MAJOR STREET RUNS EAST / WEST

54

U N S I G N A L I Z E D C R I T I C A L G A P S

APP	CRITICAL GAPS (SEC) LEFT TURN	THROUGH	RIGHT TURN
EB	5.00	---	---
WB	5.00	---	---
NB	6.00	5.50	5.00
SB	6.00	5.50	5.00

V O L U M E A L L O C A T I O N T O L A N E S

APP	LANE 1 L	T	R	LANE 2 L	T	R	LANE 3 L	T	R
EB	0	0	0	0	0	0	0	0	0
WB	0	44	0	0	0	320	0	0	0
NB	21	0	0	0	286	138	0	0	0
SB	303	0	48	0	0	0	0	0	0

U N S I G N A L I Z E D

APP		LANE 1	LANE 2	LANE 3
EB	RESERVE CAPACITY	---	---	---
	LEVEL OF SERVICE			
WB	RESERVE CAPACITY	---	---	---
	LEVEL OF SERVICE			
NB	RESERVE CAPACITY	860	407	---
	LEVEL OF SERVICE	A	A	
SB	RESERVE CAPACITY	49	---	---
	LEVEL OF SERVICE	E		

MAJOR STREET - EB/WB

INTERSECTION :
MAVERICK ?
CHELSEA
WEEKDAY NB AM PEAK 1990 CBD?N
UNSIGNALIZED
-- MAJOR STREET RUNS EAST / WEST

SB

U N S I G N A L I Z E D   C R I T I C A L   G A P S

APP	CRITICAL GAPS (SEC) LEFT TURN	THROUGH	RIGHT TURN
EB	5.00	---	---
WB	5.00	---	---
NB	0.00	0.00	0.00
SB	6.50	6.00	5.50

V O L U M E   A L L O C A T I O N   T O   L A N E S

APP	LANE 1 L	LANE 1 T	LANE 1 R	LANE 2 L	LANE 2 T	LANE 2 R	LANE 3 L	LANE 3 T	LANE 3 R
EB	66	0	0	0	0	269	0	0	0
WB	53	146	0	0	106	105	0	0	0
NB	0	0	0	0	0	0	0	0	0
SB	0	117	28	0	0	0	0	0	0

U N S I G N A L I Z E D

APP		LANE 1	LANE 2	LANE 3
EB	RESERVE CAPACITY	764	---	---
	LEVEL OF SERVICE	A		
WB	RESERVE CAPACITY	958	---	---
	LEVEL OF SERVICE	A		
NB	RESERVE CAPACITY	-	---	---
	LEVEL OF SERVICE			
SB	RESERVE CAPACITY	98	---	---
	LEVEL OF SERVICE	C		

MAJOR STREET - EB/WB

INTERSECTION :
MAVERICK SQ
CHELSEA
WEEKDAY NB PM PEAK 1990 CBD-N
UNSIGNALIZED
- MAJOR STREET RUNS EAST / WEST

58

U N S I G N A L I Z E D   C R I T I C A L   G A P S

APP	LEFT TURN	THROUGH	RIGHT TURN
	CRITICAL GAPS (SEC)		
EB	5.00	---	---
WB	5.00	---	---
NB	0.00	0.00	0.00
SB	6.50	6.00	5.50

V O L U M E   A L L O C A T I O N   T O   L A N E S

APP	LANE 1 L	LANE 1 T	LANE 1 R	LANE 2 L	LANE 2 T	LANE 2 R	LANE 3 L	LANE 3 T	LANE 3 R
EB	102	0	0	0	0	339	0	0	0
WB	59	151	0	0	143	126	0	0	0
NB	0	0	0	0	0	0	0	0	0
SB	0	162	70	0	0	0	0	0	0

U N S I G N A L I Z E D

APP		LANE 1	LANE 2	LANE 3
EB	RESERVE CAPACITY	672	---	---
	LEVEL OF SERVICE	A		
WB	RESERVE CAPACITY	787	---	---
	LEVEL OF SERVICE	A		
NB	RESERVE CAPACITY	---	---	---
	LEVEL OF SERVICE			
SB	RESERVE CAPACITY	129	---	---
	LEVEL OF SERVICE	D		

MAJOR STREET - EB/WB

INTERSECTION :
MAVERICK ST
ORLEANS
WEEKDAY NB AM PEAK 1990 CBDCN
UNSIGNALIZED
- MAJOR STREET RUNS EAST / WEST

6

U N S I G N A L I Z E D   C R I T I C A L   G A P S

APP	CRITICAL GAPS (SEC) LEFT TURN	THROUGH	RIGHT TURN
EB	5.00	---	---
WB	5.00	---	---
NB	6.50	6.00	5.50
SB	6.50	6.00	5.50

V O L U M E   A L L O C A T I O N   T O   L A N E S

APP	LANE 1 L	LANE 1 T	LANE 1 R	LANE 2 L	LANE 2 T	LANE 2 R	LANE 3 L	LANE 3 T	LANE 3 R
EB	0	0	10	0	0	0	0	0	0
WB	24	0	0	0	320	3	0	0	0
NB	58	67	0	0	0	0	0	0	0
SB	0	30	14	0	0	0	0	0	0

U N S I G N A L I Z E D

APP		LANE 1	LANE 2	LANE 3
EB	RESERVE CAPACITY LEVEL OF SERVICE	---	---	---
WB	RESERVE CAPACITY LEVEL OF SERVICE	1164 A	---	---
NB	RESERVE CAPACITY LEVEL OF SERVICE	476 A	---	---
SB	RESERVE CAPACITY LEVEL OF SERVICE	638 A	---	---

MAJOR STREET - EB/WB

INTERSECTION :
MAVERICK 9
ORLEANS
WEEKDAY NB PM PEAK 1990 CBD N
UNSIGNALIZED
- MAJOR STREET RUNS EAST / WEST
6

U N S I G N A L I Z E D   C R I T I C A L   G A P S

APP	CRITICAL GAPS (SEC) LEFT TURN	THROUGH	RIGHT TURN
EB	5.00	---	---
WB	5.00	---	---
NB	6.50	6.00	5.50
SB	6.50	6.00	5.50

V O L U M E   A L L O C A T I O N   T O   L A N E S

APP	LANE 1 L	T	R	LANE 2 L	T	R	LANE 3 L	T	R
EB	0	0	10	0	0	0	0	0	0
WB	31	0	0	0	349	15	0	0	0
NB	67	74	0	0	0	0	0	0	0
SB	0	23	39	0	0	0	0	0	0

U N S I G N A L I Z E D

APP		LANE 1	LANE 2	LANE 3
EB	RESERVE CAPACITY	---	---	---
	LEVEL OF SERVICE			
WB	RESERVE CAPACITY	1157	---	---
	LEVEL OF SERVICE	A		
NB	RESERVE CAPACITY	411	---	---
	LEVEL OF SERVICE	A		
SB	RESERVE CAPACITY	622	---	---
	LEVEL OF SERVICE	A		

MAJOR STREET - EB/WB

INTERSECTION :
SUMNER &
BREMAN
WEEKDAY NB AM PEAK 1990 CBD'N
UNSIGNALIZED
- MAJOR STREET RUNS EAST / WEST
8

U N S I G N A L I Z E D C R I T I C A L G A P S

APP	CRITICAL GAPS (SEC) LEFT TURN	THROUGH	RIGHT TURN
EB	5.00	---	---
WB	5.00	---	---
NB	6.50	6.00	5.50
SB	6.50	6.00	5.50

V O L U M E A L L O C A T I O N T O L A N E S

	LANE 1			LANE 2			LANE 3		
APP	L	T	R	L	T	R	L	T	R
EB	28	256	46	0	0	0	0	0	0
WB	1	106	13	0	0	0	0	0	0
NB	33	67	15	0	0	0	0	0	0
SB	56	24	44	0	0	0	0	0	0

U N S I G N A L I Z E D

APP		LANE 1	LANE 2	LANE 3
EB	RESERVE CAPACITY	1036	---	---
	LEVEL OF SERVICE	A		
WB	RESERVE CAPACITY	879	---	---
	LEVEL OF SERVICE	A		
NB	RESERVE CAPACITY	455	---	---
	LEVEL OF SERVICE	A		
SB	RESERVE CAPACITY	451	---	---
	LEVEL OF SERVICE	A		

MAJOR STREET - EB/WB

INTERSECTION :
SUMNER @
BREMAN
WEEKDAY NB PM PEAK 1990 CBD^N
UNSIGNALIZED
- MAJOR STREET RUNS EAST / WEST

8

U N S I G N A L I Z E D   C R I T I C A L   G A P S

APP	-----CRITICAL GAPS (SEC)----- LEFT TURN	THROUGH	RIGHT TURN
EB	5.00	---	---
WB	5.00	---	---
NB	6.50	6.00	5.50
SB	6.50	6.00	5.50

V O L U M E   A L L O C A T I O N   T O   L A N E S

APP	LANE 1			LANE 2			LANE 3		
	L	T	R	L	T	R	L	T	R
EB	24	332	64	0	0	0	0	0	0
WB	1	86	13	0	0	0	0	0	0
NB	26	58	33	0	0	0	0	0	0
SB	86	19	16	0	0	0	0	0	0

U N S I G N A L I Z E D

APP		LANE 1	LANE 2	LANE 3
EB	RESERVE CAPACITY	1062	---	---
	LEVEL OF SERVICE	A		
WB	RESERVE CAPACITY	795	---	---
	LEVEL OF SERVICE	A		
NB	RESERVE CAPACITY	449	---	---
	LEVEL OF SERVICE	[illegible]		
SB	RESERVE CAPACITY	1[illegible]	---	---
	LEVEL OF SERVICE	[illegible]		

MAJOR STREET - EB/WB

INTERSECTION :
SUMNER @
ORLEANS
WEEKDAY NB AM PEAK 1990 CBD N
UNSIGNALIZED
- MAJOR STREET RUNS EAST / WEST

9

U N S I G N A L I Z E D C R I T I C A L G A P S

APP	LEFT TURN	THROUGH	RIGHT TURN
	CRITICAL GAPS (SEC)		
EB	5.00	---	---
WB	5.00	---	---
NB	6.00	5.50	5.00
SB	6.00	5.50	5.00

V O L U M E A L L O C A T I O N T O L A N E S

APP	LANE 1 L	LANE 1 T	LANE 1 R	LANE 2 L	LANE 2 T	LANE 2 R	LANE 3 L	LANE 3 T	LANE 3 R
EB	53	175	56	0	0	0	0	0	0
WB	0	0	1	0	0	0	0	0	0
NB	121	90	15	0	0	0	0	0	0
SB	29	14	4	0	0	0	0	0	0

U N S I G N A L I Z E D

APP		LANE 1	LANE 2	LANE 3
EB	RESERVE CAPACITY	1145	---	---
	LEVEL OF SERVICE	A		
WB	RESERVE CAPACITY	---	---	---
	LEVEL OF SERVICE			
NB	RESERVE CAPACITY	533	---	---
	LEVEL OF SERVICE	A		
SB	RESERVE CAPACITY	605	---	---
	LEVEL OF SERVICE	A		

MAJOR STREET - EB/WB

INTERSECTION :
SUMNER ?
ORLEANS
WEEKDAY NB PM PEAK 1990 CBD?N
UNSIGNALIZED
-- MAJOR STREET RUNS EAST / WEST
9

U N S I G N A L I Z E D   C R I T I C A L   G A P S

APP	CRITICAL GAPS (SEC) LEFT TURN	THROUGH	RIGHT TURN
EB	5.00	---	---
WB	5.00	---	---
NB	6.00	5.50	5.00
SB	6.00	5.50	5.00

V O L U M E   A L L O C A T I O N   T O   L A N E S

APP	LANE 1 L	T	R	LANE 2 L	T	R	LANE 3 L	T	R
EB	80	333	37	0	0	0	0	0	0
WB	0	0	10	0	0	0	0	0	0
NB	100	105	35	0	0	0	0	0	0
SB	10	24	10	0	0	0	0	0	0

U N S I G N A L I Z E D

APP		LANE 1	LANE 2	LANE 3
EB	RESERVE CAPACITY	1107	---	---
	LEVEL OF SERVICE	A		
WB	RESERVE CAPACITY	---	---	---
	LEVEL OF SERVICE			
NB	RESERVE CAPACITY	368	---	---
	LEVEL OF SERVICE	B		
SB	RESERVE CAPACITY	577	---	---
	LEVEL OF SERVICE	A		

MAJOR STREET - EB/WB

1990 PHASE 1 DEVELOPMENT AM AND PM PEAK HOUR OPERATIONS

CASHMAN L1B1AM1

INTERSECTION :
PORTER @
CHELSEA
WEEKDAY PHASE 1 BLD AM 1990 CBD [illegible] N
ACTUATED SIGNAL

V O L U M E   A D J U S T M E N T

APPROACH	LANE MVM	GROUP VOLUME	FLOW RATE IN GROUP	LANE UTIL FACTOR	ADJ FLOW RATE	PROP OF TURNS LT	RT
EB	LTR	435	483	1.00	483	0.34	0.23
WB							
NB	TR	184	204	1.00	204	0.00	0.09
SB	LT	132	147	1.00	147	0.18	0.00

S A T U R A T I O N   F L O W

APP	MVM	IDEAL SAT FLOW	# OF LANES	ADJUSTMENT FACTORS WIDTH	H.V.	GRADE	PARK	BUS	AREA	RT	LT	ADJ. FLOW
EB	LTR	1800	1	1.13	0.99	1.00	1.00	1.00	1.00	0.87	0.85	1489
WB												
NB	TR	1800	1	1.07	0.99	1.00	1.00	1.00	1.00	0.94	1.00	1792
SB	LT	1800	1	1.07	0.99	1.00	1.00	1.00	1.00	1.00	0.92	1754

CASHMAN L1B1AM

INTERSECTION :
PORTER D
CHELSEA
WEEKDAY PHASE 1 BLD AM 1990 CBD ? N
ACTUATED SIGNAL
1

C A P A C I T Y   A N A L Y S I S

APP	LN GR MVM	ADJ FLOW RATE	PMSV LT FLOW	ADJ SAT FLW RT	FLOW RATIO	CRIT ?	GREEN RATIO	LN GR CAPACITY	V/C RATIO
EB	LTR	483	0	1489	0.324	Y	0.529	788	0.613
WB									
NB	TR	204	0	1792	0.114	Y	0.392	703	0.290
SB	LT	147	0	1754	0.084	N	0.392	688	0.214

CYCLE LENGTH : 102.0 SUM OF CRITICAL LANES' FLOW RATIOS : 0.438
LOSS TIME PER CYCLE : 6 INTERSECTION V/C : 0.465

L E V E L   O F   S E R V I C E

APP	LN GR MVM	V/C RATIO	GREEN RATIO	CYC LEN	1st DELAY	LN GR CAP	2nd DELAY	PF	LN GR DELAY	LN GR LOS	APP DELAY	AP LO
EB	LTR	0.613	0.529	102	12.7	788	1.0	0.85	11.6	B	11.6	B
WB												
NB	TR	0.290	0.392	102	16.2	703	0.1	0.85	13.9	B	13.8	B
SB	LT	0.214	0.392	102	15.6	688	0.0	0.85	13.3	B	13.1	B

INTERSECTION DELAY : 12.4 secs/veh
LEVEL OF SERVICE : B

CASHMAN L1B1PM1

INTERSECTION :
PORTER @
CHELSEA
WEEKDAY PHASE 1 BLD PM 1990 CBD ? N
ACTUATED SIGNAL

V O L U M E   A D J U S T M E N T

APPROACH	LANE MVM	GROUP VOLUME	FLOW RATE IN GROUP	LANE UTIL FACTOR	ADJ FLOW RATE	PROP OF TURNS LT	PROP OF TURNS RT
EB	LTR	617	686	1.00	686	0.51	0.18
WB							
NB	TR	290	322	1.00	322	0.00	0.13
SB	LT	301	334	1.00	334	0.23	0.00

S A T U R A T I O N   F L O W

APP	MVM	IDEAL SAT FLOW	# OF LANES	WIDTH	H.V.	GRADE	PARK	BUS	AREA	RT	LT	ADJ. FLOW
				ADJUSTMENT FACTORS								
EB	LTR	1800	1	1.13	0.99	1.00	1.00	1.00	1.00	0.89	0.83	1487
WB												
NB	TR	1800	1	1.07	0.99	1.00	1.00	1.00	1.00	0.92	1.00	1754
SB	LT	1800	1	1.07	0.99	1.00	1.00	1.00	1.00	1.00	0.77	1468

CASHMAN L3B1PM

INTERSECTION :
PORTER S
CHELSEA
WEEKDAY PHASE 1 BLD PM 1990 CBD ? N
ACTUATED SIGNAL

C A P A C I T Y   A N A L Y S I S

APP	LN GR MVM	ADJ FLOW RATE	PMSV LT FLOW	ADJ SAT FLW RT	FLOW RATIO	CRIT ?	GREEN RATIO	LN GR CAPACITY	V/C RATIO
EB	LTR	686	0	1487	0.461	Y	0.529	787	0.872
WB									
NB	TR	322	0	1754	0.184	N	0.392	688	0.468
SB	LT	334	0	1468	0.228	Y	0.392	576	0.580

CYCLE LENGTH : 102.0
LOSS TIME PER CYCLE : 6

SUM OF CRITICAL LANES' FLOW RATIOS : 0.689
INTERSECTION V/C : 0.732

L E V E L   O F   S E R V I C E

APP	LN GR MVM	V/C RATIO	GREEN RATIO	CYC LEN	1st DELAY	LN GR CAP	2nd DELAY	PF	LN GR DELAY	LN GR LOS	APP DELAY	AP L
EB	LTR	0.872	0.529	102	15.9	787	7.5	0.85	19.9	C	19.8	(
WB												
NB	TR	0.468	0.392	102	17.5	688	0.4	0.85	15.2	C	15.1	(
SB	LT	0.580	0.392	102	18.5	576	1.1	0.85	16.7	C	16.6	(

INTERSECTION DELAY : 17.8 secs/veh
LEVEL OF SERVICE : C

INTERSECTION :
PORTER @
ORLEANS
WEEKDAY PHASE 1 BLD AM 1990 CBD 7 N
ACTUATED SIGNAL

2

V O L U M E   A D J U S T M E N T

APPROACH	LANE MVM	GROUP VOLUME	FLOW RATE IN GROUP	LANE UTIL FACTOR	ADJ FLOW RATE	PROP OF TURNS LT	PROP OF TURNS RT
EB	LTR	206	229	1.00	229	0.25	0.37
WB	LTR	86	96	1.00	96	0.49	0.05
NB	LTR	78	87	1.00	87	0.56	0.37
SB	LTR	38	42	1.00	42	0.11	0.61

S A T U R A T I O N   F L O W

APP	MVM	IDEAL SAT FLOW	# OF LANES	ADJUSTMENT FACTORS WIDTH	H.V.	GRADE	PARK	BUS	AREA	RT	LT	ADJ. FLOW
EB	LTR	1800	1	1.13	0.99	1.00	1.00	1.00	1.00	0.85	0.98	1677
WB	LTR	1800	1	1.13	0.99	1.00	1.00	1.00	1.00	0.97	0.85	1660
NB	LTR	1800	1	1.00	0.99	1.00	1.00	1.00	1.00	0.85	0.96	1454
SB	LTR	1800	1	0.90	0.99	1.00	1.00	1.00	1.00	0.82	1.00	1315

CASHMAN L2B1A[illegible]

INTERSECTION :
PORTER D
ORLEANS
WEEKDAY PHASE 1 BLD AM 1990 CBD ? N
ACTUATED SIGNAL

2

C A P A C I T Y   A N A L Y S I S

APP	LN GR MVM	ADJ FLOW RATE	PMSV LT FLOW	ADJ SAT FLW RT	FLOW RATIO	CRIT ?	GREEN RATIO	LN GR CAPACITY	V/C RATIO
EB	LTR	229	0	1677	0.137	Y	0.548	919	0.249
WB	LTR	96	0	1660	0.058	N	0.548	910	0.105
NB	LTR	87	0	1454	0.060	Y	0.342	498	0.175
SB	LTR	42	0	1315	0.032	N	0.342	450	0.093

CYCLE LENGTH : 73.0
LOSS TIME PER CYCLE : 6

SUM OF CRITICAL LANES' FLOW RATIOS : 0.197
INTERSECTION V/C : 0.215

L E V E L   O F   S E R V I C E

APP	LN GR MVM	V/C RATIO	GREEN RATIO	CYC LEN	1st DELAY	LN GR CAP	2nd DELAY	PF	LN GR DELAY	LN GR LOS	APP DELAY	AP LO
EB	LTR	0.249	0.548	73	6.6	919	0.0	0.85	5.6	B	5.6	[illegible]
WB	LTR	0.105	0.548	73	6.0	910	0.0	0.85	5.1	B	5.0	[illegible]
NB	LTR	0.175	0.342	73	12.8	498	0.0	0.85	10.9	B	10.7	[illegible]
SB	LTR	0.093	0.342	73	12.4	450	0.0	0.85	10.5	B	10.0	[illegible]

INTERSECTION DELAY : 6.9 secs/veh
LEVEL OF SERVICE : B

CASHMAN L2B1PM

INTERSECTION :
PORTER @
ORLEANS
WEEKDAY PHASE 1 BLD PM 1990 CBD ? N
ACTUATED SIGNAL

2

V O L U M E   A D J U S T M E N T

APPROACH	LANE MVM	GROUP VOLUME	FLOW RATE IN GROUP	LANE UTIL FACTOR	ADJ FLOW RATE	PROP OF TURNS LT	PROP OF TURNS RT
EB	LTR	255	283	1.00	283	0.06	0.24
WB	LTR	94	104	1.00	104	0.37	0.04
NB	LTR	104	116	1.00	116	0.76	0.17
SB	LTR	32	36	1.00	36	0.12	0.65

S A T U R A T I O N   F L O W

APP	MVM	IDEAL SAT FLOW	# OF LANES	ADJUSTMENT FACTORS WIDTH	H.V.	GRADE	PARK	BUS	AREA	RT	LT	ADJ. FLOW
EB	LTR	1800	1	1.13	0.99	1.00	1.00	1.00	1.00	0.87	1.00	1752
WB	LTR	1800	1	1.13	0.99	1.00	1.00	1.00	1.00	0.97	0.83	1621
NB	LTR	1800	1	1.00	0.99	1.00	1.00	1.00	1.00	0.89	0.93	1475
SB	LTR	1800	1	0.90	0.99	1.00	1.00	1.00	1.00	0.81	1.00	1299

CASHMAN LZB1PM

INTERSECTION :
PORTER @
ORLEANS
WEEKDAY PHASE 1 BLD PM 1990 CBD ? N
ACTUATED SIGNAL

2

C A P A C I T Y   A N A L Y S I S

APP	LN GR MVM	ADJ FLOW RATE	PMSV LT FLOW	ADJ SAT FLW RT	FLOW RATIO	CRIT ?	GREEN RATIO	LN GR CAPACITY	V/C RATIO
EB	LTR	283	0	1752	0.162	Y	0.548	960	0.295
WB	LTR	104	0	1621	0.064	N	0.548	888	0.117
NB	LTR	116	0	1475	0.079	Y	0.342	505	0.230
SB	LTR	36	0	1299	0.028	N	0.342	445	0.081

CYCLE LENGTH : 73.0
LOSS TIME PER CYCLE : 6

SUM OF CRITICAL LANES' FLOW RATIOS : 0.241
INTERSECTION V/C : 0.263

L E V E L   O F   S E R V I C E

APP	LN GR MVM	V/C RATIO	GREEN RATIO	CYC LEN	1st DELAY	LN GR CAP	2nd DELAY	PF	LN GR DELAY	LN GR LOS	APP DELAY	AP LO
EB	LTR	0.295	0.548	73	6.8	960	0.1	0.85	5.9	B	5.9	B
WB	LTR	0.117	0.548	73	6.1	888	0.0	0.85	5.2	B	5.1	B
NB	LTR	0.230	0.342	73	13.0	505	0.0	0.85	11.0	B	10.8	B
SB	LTR	0.081	0.342	73	12.3	445	0.0	0.85	10.5	B	9.9	B

INTERSECTION DELAY : 7.1 secs/veh
LEVEL OF SERVICE : B

CASHMAN CASBIAM

INTERSECTION :
SUMNER @
MERIDIAN
WEEKDAY PHASE 1 BLD AM 1990 CBD ? N
ACTUATED SIGNAL
3A

V O L U M E   A D J U S T M E N T

APPROACH	LANE MVM	GROUP VOLUME	FLOW RATE IN GROUP	LANE UTIL FACTOR	ADJ FLOW RATE	PROP OF TURNS LT	RT
EB	LT	194	216	1.00	216	0.55	0.00
WB	T	82	91	1.00	91	0.00	0.00
	R	301	334	1.00	334	0.00	1.00
SB	R	10	11	1.00	11	0.00	1.00

S A T U R A T I O N   F L O W

APP	MVM	IDEAL SAT FLOW	# OF LANES	ADJUSTMENT FACTORS WIDTH	H.V.	GRADE	PARK	BUS	AREA	RT	LT	ADJ. FLOW
EB	LT	1800	1	1.13	0.99	1.00	1.00	1.00	1.00	1.00	0.68	1369
WB	T	1800	1	1.13	0.99	1.00	1.00	1.00	1.00	1.00	1.00	2014
	R	1800	1	1.03	0.99	1.00	1.00	1.00	1.00	0.85	1.00	1560
SB	R	1800	1	0.87	0.99	1.00	1.00	1.00	1.00	0.85	1.00	1318

CASHMAN LJAB1A

INTERSECTION :
SUMNER @
MERIDIAN
WEEKDAY PHASE 1 BLD AM 1990 CBD ? N
ACTUATED SIGNAL

3A

CAPACITY ANALYSIS

APP	LN GR MVM	ADJ FLOW RATE	PMSV LT FLOW	ADJ SAT FLW RT	FLOW RATIO	CRIT ?	GREEN RATIO	LN GR CAPACITY	V/C RATIO
EB	LT	216	0	1369	0.158	N	0.286	391	0.552
WB	T	91	0	2014	0.045	N	0.286	575	0.158
	R	334	0	1560	0.214	Y	0.286	446	0.749
SB	R	11	0	1318	0.008	Y	0.357	471	0.023

CYCLE LENGTH : 70.0
LOSS TIME PER CYCLE : 6

SUM OF CRITICAL LANES' FLOW RATIOS : 0.222
INTERSECTION V/C : 0.243

LEVEL OF SERVICE

APP	LN GR MVM	V/C RATIO	GREEN RATIO	CYC LEN	1st DELAY	LN GR CAP	2nd DELAY	PF	LN GR DELAY	LN GR LOS	APP DELAY	AP LO
EB	LT	0.552	0.286	70	16.1	391	1.3	0.85	14.8	B	14.7	B
WB	T	0.158	0.286	70	14.2	575	0.0	0.85	12.1	B		
	R	0.749	0.286	70	17.3	446	4.7	0.85	18.7	C	17.2	C
SB	R	0.023	0.357	70	11.1	471	0.0	0.85	9.4	B	8.0	B

INTERSECTION DELAY : 16.1 secs/veh
LEVEL OF SERVICE : C

CASHMAN TABLE 4

INTERSECTION :
SUMNER @
MERIDIAN
WEEKDAY PHASE 1 BLD PM 1990 CBD ? N
ACTUATED SIGNAL

3A

V O L U M E   A D J U S T M E N T

APPROACH	LANE GROUP MVM	VOLUME	FLOW RATE IN GROUP	LANE UTIL FACTOR	ADJ FLOW RATE	PROP OF TURNS LT	RT
EB	LT	186	207	1.00	207	0.48	0.00
WB	T	85	94	1.00	94	0.00	0.00
	R	299	332	1.00	332	0.00	1.00
SB	R	10	11	1.00	11	0.00	1.00

S A T U R A T I O N   F L O W

APP	MVM	IDEAL SAT FLOW	# OF LANES	ADJUSTMENT FACTORS WIDTH	H.V.	GRADE	PARK	BUS	AREA	RT	LT	ADJ. FLOW
EB	LT	1800	1	1.13	0.99	1.00	1.00	1.00	1.00	1.00	0.72	1450
WB	T	1800	1	1.13	0.99	1.00	1.00	1.00	1.00	1.00	1.00	2014
	R	1800	1	1.03	0.99	1.00	1.00	1.00	1.00	0.85	1.00	1560
SB	R	1800	1	0.87	0.99	1.00	1.00	1.00	1.00	0.85	1.00	1318

CASHMAN L?AB1

INTERSECTION :
SUMNER 3
MERIDIAN
WEEKDAY PHASE 1 BLD PM 1990 CBD ? N
ACTUATED SIGNAL

3A

C A P A C I T Y   A N A L Y S I S

APP	LN GR MVM	ADJ FLOW RATE	PMSV LT FLOW	ADJ SAT FLW RT	FLOW RATIO	CRIT ?	GREEN RATIO	LN GR CAPACITY	V/C RATIO
EB	LT	207	0	1450	0.143	N	0.286	414	0.500
WB	T	94	0	2014	0.047	N	0.286	575	0.163
	R	332	0	1560	0.213	Y	0.286	446	0.744
SB	R	11	0	1318	0.008	Y	0.357	471	0.023

CYCLE LENGTH : 70.0
LOSS TIME PER CYCLE : 6

SUM OF CRITICAL LANES' FLOW RATIOS : 0.221
INTERSECTION V/C : 0.242

L E V E L   O F   S E R V I C E

APP	LN GR MVM	V/C RATIO	GREEN RATIO	CYC LEN	1st DELAY	LN GR CAP	2nd DELAY	PF	LN GR DELAY	LN GR LOS	APP DELAY	AP LO
EB	LT	0.500	0.286	70	15.8	414	0.8	0.85	14.1	B	14.0	I
WB	T	0.163	0.286	70	14.2	575	0.0	0.85	12.1	B		
	R	0.744	0.286	70	17.2	446	4.6	0.85	18.5	C	17.0	(
SB	R	0.023	0.357	70	11.1	471	0.0	0.85	9.4	B	8.0	

INTERSECTION DELAY : 15.8 secs/veh
LEVEL OF SERVICE : C

CASHMAN TBR1AM

INTERSECTION :
SUMNER 3
CHELSEA
WEEKDAY PHASE 1 BLD AM 1990 CBD ? N
ACTUATED SIGNAL
3B

V O L U M E   A D J U S T M E N T

APPROACH	LANE MVM	GROUP VOLUME	FLOW RATE IN GROUP	LANE UTIL FACTOR	ADJ FLOW RATE	PROP OF TURNS LT	PROP OF TURNS RT
EB	T	87	97	1.00	97	0.00	0.00
WB	T	186	207	1.05	217	0.00	0.00
SB	L	295	328	1.00	328	1.00	0.00
	R	197	219	1.00	219	0.00	1.00

S A T U R A T I O N   F L O W

APP	MVM	IDEAL SAT FLOW	# OF LANES	ADJUSTMENT FACTORS WIDTH	H.V.	GRADE	PARK	BUS	AREA	RT	LT	ADJ. FLOW
EB	T	1800	1	1.13	0.99	1.00	1.00	1.00	1.00	1.00	1.00	2014
WB	T	1800	2	1.08	0.99	1.00	1.00	1.00	1.00	1.00	1.00	3849
SB	L	1800	1	1.13	0.99	1.00	1.00	1.00	1.00	1.00	0.85	1712
	R	1800	1	1.13	0.99	1.00	1.00	1.00	1.00	0.85	1.00	1712

CASHMAN LIRB1-

INTERSECTION :
SUMNER 3
CHELSEA
WEEKDAY PHASE 1 BLD AM 1990 CBD ? N
ACTUATED SIGNAL
3A

C A P A C I T Y   A N A L Y S I S

APP	LN GR MVM	ADJ FLOW RATE	PMSV LT FLOW	ADJ SAT FLW RT	FLOW RATIO	CRIT ?	GREEN RATIO	LN GR CAPACITY	V/C RATIO
EB	T	97	0	2014	0.048	N	0.286	575	0.169
WB	T	217	0	3849	0.056	Y	0.286	1100	0.197
SB	L	328	0	1712	0.192	Y	0.357	611	0.537
	R	219	0	1712	0.128	N	0.357	611	0.358

CYCLE LENGTH : 70.0
LOSS TIME PER CYCLE : 6
SUM OF CRITICAL LANES' FLOW RATIOS : 0.248
INTERSECTION V/C : 0.271

L E V E L   O F   S E R V I C E

APP	LN GR MVM	V/C RATIO	GREEN RATIO	CYC LEN	1st DELAY	LN GR CAP	2nd DELAY	PF	LN GR DELAY	LN GR LOS	APP DELAY	AP LO
EB	T	0.169	0.286	70	14.3	575	0.0	0.85	12.2	B	12.0	B
WB	T	0.197	0.286	70	14.4	1100	0.0	0.85	12.2	B	12.1	B
SB	L	0.537	0.357	70	13.6	611	0.7	0.85	12.2	B		
	R	0.358	0.357	70	12.6	611	0.2	0.85	10.9	B	11.7	B

INTERSECTION DELAY : 11.8 secs/veh
LEVEL OF SERVICE : B

CASHMAN L3BB1PM

INTERSECTION :
SUMNER 3
CHELSEA
WEEKDAY PHASE 1 BLD PM 1990 CBD ? N
ACTUATED SIGNAL

3b

V O L U M E   A D J U S T M E N T

APPROACH	LANE MVM	GROUP VOLUME	FLOW RATE IN GROUP	LANE UTIL FACTOR	ADJ FLOW RATE	PROP OF TURNS LT	RT
EB	T	97	108	1.00	108	0.00	0.00
WB	T	145	161	1.05	169	0.00	0.00
SB	L	335	372	1.00	372	1.00	0.00
	R	239	266	1.00	266	0.00	1.00

S A T U R A T I O N   F L O W

APP	MVM	IDEAL SAT FLOW	# OF LANES	ADJUSTMENT FACTORS WIDTH	H.V.	GRADE	PARK	BUS	AREA	RT	LT	ADJ. FLOW
EB	T	1800	1	1.13	0.99	1.00	1.00	1.00	1.00	1.00	1.00	2014
WB	T	1800	2	1.08	0.99	1.00	1.00	1.00	1.00	1.00	1.00	3849
SB	L	1800	1	1.13	0.99	1.00	1.00	1.00	1.00	1.00	0.85	1712
	R	1800	1	1.13	0.99	1.00	1.00	1.00	1.00	0.85	1.00	1712

CASHMAN LIBB1

INTERSECTION :
SUMNER @
CHELSEA
WEEKDAY PHASE 1 BLD PM 1990 CBD ? N
ACTUATED SIGNAL

3b

C A P A C I T Y   A N A L Y S I S

APP	LN GR MVM	ADJ FLOW RATE	PMSV LT FLOW	ADJ SAT FLW RT	FLOW RATIO	CRIT ?	GREEN RATIO	LN GR CAPACITY	V/C RATIO
EB	T	108	0	2014	0.054	Y	0.286	575	0.188
WB	T	169	0	3849	0.044	N	0.286	1100	0.154
SB	L	372	0	1712	0.217	Y	0.357	611	0.609
	R	266	0	1712	0.155	N	0.357	611	0.435

CYCLE LENGTH : 70.0
LOSS TIME PER CYCLE : 6

SUM OF CRITICAL LANES' FLOW RATIOS : 0.271
INTERSECTION V/C : 0.296

L E V E L   O F   S E R V I C E

APP	LN GR MVM	V/C RATIO	GREEN RATIO	CYC LEN	1st DELAY	LN GR CAP	2nd DELAY	PF	LN GR DELAY	LN GR LOS	APP DELAY	AP LO
EB	T	0.188	0.286	70	14.3	575	0.0	0.85	12.2	B	12.0	B
WB	T	0.154	0.286	70	14.2	1100	0.0	0.85	12.1	B	12.0	B
SB	L	0.609	0.357	70	14.0	611	1.3	0.85	13.0	B		
	R	0.435	0.357	70	13.0	611	0.3	0.85	11.3	B	12.3	B

INTERSECTION DELAY : 12.2 secs/veh
LEVEL OF SERVICE : B

INTERSECTION :
PORTER @
BREMAN
WEEKDAY PHASE 1 BLD AM 1990 CBD N
UNSIGNALIZED
- MAJOR STREET RUNS EAST / WEST

4

U N S I G N A L I Z E D   C R I T I C A L   G A P S

APP	LEFT TURN	THROUGH	RIGHT TURN
	CRITICAL GAPS (SEC)		
EB	5.00	---	---
WB	5.00	---	---
NB	6.50	6.00	5.50
SB	6.50	6.00	5.50

V O L U M E   A L L O C A T I O N   T O   L A N E S

APP	LANE 1 L	LANE 1 T	LANE 1 R	LANE 2 L	LANE 2 T	LANE 2 R	LANE 3 L	LANE 3 T	LANE 3 R
EB	49	0	0	0	149	34	0	0	0
WB	7	44	47	0	0	0	0	0	0
NB	2	27	0	0	0	0	0	0	0
SB	80	201	0	0	0	0	0	0	0

U N S I G N A L I Z E D

APP		LANE 1	LANE 2	LANE 3
EB	RESERVE CAPACITY	1046	---	---
	LEVEL OF SERVICE	A		
WB	RESERVE CAPACITY	990	---	---
	LEVEL OF SERVICE	A		
NB	RESERVE CAPACITY	611	---	---
	LEVEL OF SERVICE	A		
SB	RESERVE CAPACITY	379	---	---
	LEVEL OF SERVICE	B		

MAJOR STREET - EB/WB

INTERSECTION :
PORTER @
BREMAN
WEEKDAY PHASE 1 BLD PM 1990 CBD N
UNSIGNALIZED
- MAJOR STREET RUNS EAST / WEST

4

U N S I G N A L I Z E D C R I T I C A L G A P S

APP	CRITICAL GAPS (SEC) LEFT TURN	THROUGH	RIGHT TURN
EB	5.00	---	---
WB	5.00	---	---
NB	6.50	6.00	5.50
SB	6.50	6.00	5.50

V O L U M E A L L O C A T I O N T O L A N E S

APP	LANE 1 L	LANE 1 T	LANE 1 R	LANE 2 L	LANE 2 T	LANE 2 R	LANE 3 L	LANE 3 T	LANE 3 R
EB	38	0	0	0	230	36	0	0	0
WB	3	90	53	0	0	0	0	0	0
NB	20	135	11	0	0	0	0	0	0
SB	94	173	0	0	0	0	0	0	0

U N S I G N A L I Z E D

APP		LANE 1	LANE 2	LANE 3
EB	RESERVE CAPACITY	1000	---	---
	LEVEL OF SERVICE	A		
WB	RESERVE CAPACITY	912	---	---
	LEVEL OF SERVICE	A		
NB	RESERVE CAPACITY	377	---	---
	LEVEL OF SERVICE	B		
SB	RESERVE CAPACITY	229	---	---
	LEVEL OF SERVICE	C		

MAJOR STREET - EB/WB

HMM ASSOCIATES 1 17 1988

CASHMAN L5AR141

INTERSECTION :
MAVERICK @
MERIDIAN
WEEKDAY PHASE 1 BLD AM 1990 CBD'N
UNSIGNALIZED
 - MAJOR STREET RUNS EAST / WEST

5A

U N S I G N A L I Z E D   C R I T I C A L   G A P S

APP	LEFT TURN	THROUGH	RIGHT TURN
	------------CRITICAL GAPS (SEC)-----------		
EB	5.00	---	---
WB	5.00	---	---
NB	6.00	5.50	5.00
SB	6.00	5.50	5.00

V O L U M E   A L L O C A T I O N   T O   L A N E S

APP	LANE 1			LANE 2			LANE 3		
	L	T	R	L	T	R	L	T	R
EB	0	1	0	0	0	0	0	0	0
WB	0	59	0	0	0	226	0	0	0
NB	28	0	0	0	324	77	0	0	0
SB	288	0	24	0	0	0	0	0	0

U N S I G N A L I Z E D

APP		LANE 1	LANE 2	LANE 3
EB	RESERVE CAPACITY	---	---	---
	LEVEL OF SERVICE			
WB	RESERVE CAPACITY	---	---	---
	LEVEL OF SERVICE			
NB	RESERVE CAPACITY	875	447	---
	LEVEL OF SERVICE	A	A	
SB	RESERVE CAPACITY	82	---	---
	LEVEL OF SERVICE	E		

MAJOR STREET - EB/WB

INTERSECTION :
MAVERICK @
MERIDIAN
WEEKDAY PHASE 1 BLD PM 1990 CBDTN
UNSIGNALIZED
- MAJOR STREET RUNS EAST / WEST

5A

U N S I G N A L I Z E D   C R I T I C A L   G A P S

APP	CRITICAL GAPS (SEC) LEFT TURN	THROUGH	RIGHT TURN
EB	5.00	---	---
WB	5.00	---	---
NB	6.00	5.50	5.00
SB	6.00	5.50	5.00

V O L U M E   A L L O C A T I O N   T O   L A N E S

APP	LANE 1 L	T	R	LANE 2 L	T	R	LANE 3 L	T	R
EB	0	1	0	0	0	0	0	0	0
WB	0	44	0	0	0	348	0	0	0
NB	21	0	0	0	302	138	0	0	0
SB	309	0	48	0	0	0	0	0	0

U N S I G N A L I Z E D

APP		LANE 1	LANE 2	LANE 3
EB	RESERVE CAPACITY	---	---	---
	LEVEL OF SERVICE			
WB	RESERVE CAPACITY	---	---	---
	LEVEL OF SERVICE			
NB	RESERVE CAPACITY	859	364	---
	LEVEL OF SERVICE	A	B	
SB	RESERVE CAPACITY	15	---	---
	LEVEL OF SERVICE	E		

MAJOR STREET - EB/WB

INTERSECTION :
MAVERICK 2
CHELSEA
WEEKDAY PHASE 1 BLD AM 1990 CBD'N
UNSIGNALIZED
- MAJOR STREET RUNS EAST / WEST

5B

U N S I G N A L I Z E D   C R I T I C A L   G A P S

APP	CRITICAL GAPS (SEC) LEFT TURN	THROUGH	RIGHT TURN
EB	5.00	---	---
WB	5.00	---	---
NB	0.00	0.00	0.00
SB	6.50	6.00	5.50

V O L U M E   A L L O C A T I O N   T O   L A N E S

APP	LANE 1 L	LANE 1 T	LANE 1 R	LANE 2 L	LANE 2 T	LANE 2 R	LANE 3 L	LANE 3 T	LANE 3 R
EB	66	0	0	0	0	299	0	0	0
WB	53	150	0	0	107	108	0	0	0
NB	0	0	0	0	0	0	0	0	0
SB	0	139	28	0	0	0	0	0	0

U N S I G N A L I Z E D

APP		LANE 1	LANE 2	LANE 3
EB	RESERVE CAPACITY	756	---	---
	LEVEL OF SERVICE	A		
WB	RESERVE CAPACITY	830	---	---
	LEVEL OF SERVICE	A		
NB	RESERVE CAPACITY	---	---	---
	LEVEL OF SERVICE			
SB	RESERVE CAPACITY	[illegible]78	---	---
	LEVEL OF SERVICE	C		

MAJOR STREET - EB/WB

INTERSECTION :
MAVERICK ②
CHELSEA
WEEKDAY PHASE 1 BLD PM 1990 CBD-N
UNSIGNALIZED
- MAJOR STREET RUNS EAST / WEST

5B

U N S I G N A L I Z E D C R I T I C A L G A P S

APP	CRITICAL GAPS (SEC) LEFT TURN	THROUGH	RIGHT TURN
EB	5.00	---	---
WB	5.00	---	---
NB	0.00	0.00	0.00
SB	6.50	6.00	5.50

V O L U M E A L L O C A T I O N T O L A N E S

APP	LANE 1 L	LANE 1 T	LANE 1 R	LANE 2 L	LANE 2 T	LANE 2 R	LANE 3 L	LANE 3 T	LANE 3 R
EB	102	0	0	0	0	345	0	0	0
WB	59	176	0	0	149	146	0	0	0
NB	0	0	0	0	0	0	0	0	0
SB	0	166	70	0	0	0	0	0	0

U N S I G N A L I Z E D

APP		LANE 1	LANE 2	LANE 3
EB	**RESERVE CAPACITY**	630	---	---
	LEVEL OF SERVICE	A		
WB	RESERVE CAPACITY	781	---	---
	LEVEL OF SERVICE	A		
NB	RESERVE CAPACITY	---	---	---
	LEVEL OF SERVICE			
SB	RESERVE CAPACITY	100	---	---
	LEVEL OF SERVICE	D		

MAJOR STREET - EB/WB

INTERSECTION :
MAVERICK @
ORLEANS
WEEKDAY PHASE 1 BLD AM 1990 CBD'N
UNSIGNALIZED
- MAJOR STREET RUNS EAST / WEST

6

UNSIGNALIZED CRITICAL GAPS

APP	CRITICAL GAPS (SEC) LEFT TURN	THROUGH	RIGHT TURN
EB	5.00	---	---
WB	5.00	---	---
NB	6.50	6.00	5.50
SB	6.50	6.00	5.50

VOLUME ALLOCATION TO LANES

APP	LANE 1 L	LANE 1 T	LANE 1 R	LANE 2 L	LANE 2 T	LANE 2 R	LANE 3 L	LANE 3 T	LANE 3 R
EB	0	0	10	0	0	0	0	0	0
WB	24	0	0	0	320	3	0	0	0
NB	67	68	0	0	0	0	0	0	0
SB	0	56	14	0	0	0	0	0	0

UNSIGNALIZED

APP		LANE 1	LANE 2	LANE 3
EB	RESERVE CAPACITY	---	---	---
	LEVEL OF SERVICE			
WB	RESERVE CAPACITY	1164	---	---
	LEVEL OF SERVICE	A		
NB	RESERVE CAPACITY	441	---	---
	LEVEL OF SERVICE	A		
SB	RESERVE CAPACITY	599	---	---
	LEVEL OF SERVICE	A		

MAJOR STREET - EB/WB

INTERSECTION :
MAVERICK 3
ORLEANS
WEEKDAY PHASE 1 BLD PM 1990 CBD^N
UNSIGNALIZED
- MAJOR STREET RUNS EAST / WEST

6

U N S I G N A L I Z E D   C R I T I C A L   G A P S

APP	CRITICAL GAPS (SEC) LEFT TURN	THROUGH	RIGHT TURN
EB	5.00	---	---
WB	5.00	---	---
NB	6.50	6.00	5.50
SB	6.50	6.00	5.50

V O L U M E   A L L O C A T I O N   T O   L A N E S

APP	LANE 1 L	T	R	LANE 2 L	T	R	LANE 3 L	T	R
EB	0	0	10	0	0	0	0	0	0
WB	31	0	0	0	349	15	0	0	0
NB	128	78	0	0	0	0	0	0	0
SB	0	28	39	0	0	0	0	0	0

U N S I G N A L I Z E D

APP		LANE 1	LANE 2	LANE 3
EB	RESERVE CAPACITY LEVEL OF SERVICE	---	---	---
WB	RESERVE CAPACITY LEVEL OF SERVICE	1157 A	---	---
NB	RESERVE CAPACITY LEVEL OF SERVICE	325 B	---	---
SB	RESERVE CAPACITY LEVEL OF SERVICE	611 A	---	---

MAJOR STREET - EB/WB

INTERSECTION :
SUMNER @
BREMEN
WEEKDAY PHASE 1 BLD AM 1990 CBD-N
UNSIGNALIZED
- MAJOR STREET RUNS EAST / WEST

8

U N S I G N A L I Z E D   C R I T I C A L   G A P S

	CRITICAL GAPS (SEC)		
APP	LEFT TURN	THROUGH	RIGHT TURN
EB	5.00	---	---
WB	5.00	---	---
NB	6.50	6.00	5.50
SB	6.50	6.00	5.50

V O L U M E   A L L O C A T I O N   T O   L A N E S

	LANE 1			LANE 2			LANE 3		
APP	L	T	R	L	T	R	L	T	R
EB	28	308	46	0	0	0	0	0	0
WB	1	109	13	0	0	0	0	0	0
NB	33	67	15	0	0	0	0	0	0
SB	64	24	44	0	0	0	0	0	0

U N S I G N A L I Z E D

APP		LANE 1	LANE 2	LANE 3
EB	RESERVE CAPACITY	1033	---	---
	LEVEL OF SERVICE	A		
WB	RESERVE CAPACITY	832	---	---
	LEVEL OF SERVICE	A		
NB	RESERVE CAPACITY	415	---	---
	LEVEL OF SERVICE	A		
SB	RESERVE CAPACITY	394	---	---
	LEVEL OF SERVICE	B		

MAJOR STREET - EB/WB

INTERSECTION :
SUMNER D
BREMEN
WEEKDAY PHASE 1 BLD PM 1990 CBD^N
UNSIGNALIZED
- MAJOR STREET RUNS EAST / WEST

8

U N S I G N A L I Z E D   C R I T I C A L   G A P S

APP	CRITICAL GAPS (SEC) LEFT TURN	THROUGH	RIGHT TURN
EB	5.00	---	---
WB	5.00	---	---
NB	6.50	6.00	5.50
SB	6.50	6.00	5.50

V O L U M E   A L L O C A T I O N   T O   L A N E S

APP	LANE 1 L	T	R	LANE 2 L	T	R	LANE 3 L	T	R
EB	24	342	64	0	0	0	0	0	0
WB	1	102	13	0	0	0	0	0	0
NB	26	58	33	0	0	0	0	0	0
SB	87	19	16	0	0	0	0	0	0

U N S I G N A L I Z E D

APP		LANE 1	LANE 2	LANE 3
EB	RESERVE CAPACITY	1045	---	---
	LEVEL OF SERVICE	A		
WB	RESERVE CAPACITY	787	---	---
	LEVEL OF SERVICE	A		
NB	RESERVE CAPACITY	432	---	---
	LEVEL OF SERVICE	A		
SB	RESERVE CAPACITY	299	---	---
	LEVEL OF SERVICE	C		

MAJOR STREET - EB/WB

INTERSECTION :
SUMNER 9
ORLEANS
WEEKDAY PHASE 1 BLD AM 1990 CBD N
UNSIGNALIZED
- MAJOR STREET RUNS EAST / WEST

9

U N S I G N A L I Z E D C R I T I C A L G A P S

APP	CRITICAL GAPS (SEC) LEFT TURN	THROUGH	RIGHT TURN
EB	5.00	---	---
WB	5.00	---	---
NB	6.00	5.50	5.00
SB	6.00	5.50	5.00

V O L U M E A L L O C A T I O N T O L A N E S

APP	LANE 1 L	LANE 1 T	LANE 1 R	LANE 2 L	LANE 2 T	LANE 2 R	LANE 3 L	LANE 3 T	LANE 3 R
EB	53	175	116	0	0	0	0	0	0
WB	0	0	1	0	0	0	0	0	0
NB	124	99	15	0	0	0	0	0	0
SB	29	40	4	0	0	0	0	0	0

U N S I G N A L I Z E D

APP		LANE 1	LANE 2	LANE 3
EB	RESERVE CAPACITY	1145	---	---
	LEVEL OF SERVICE	A		
WB	RESERVE CAPACITY	---	---	---
	LEVEL OF SERVICE			
NB	RESERVE CAPACITY	471	---	---
	LEVEL OF SERVICE	A		
SB	RESERVE CAPACITY	565	---	---
	LEVEL OF SERVICE	A		

MAJOR STREET - EB/WB

INTERSECTION :
SUMNER D
ORLEANS
WEEKDAY PHASE 1 BLD PM 1990 CBD?N
UNSIGNALIZED
- MAJOR STREET RUNS EAST / WEST

1

U N S I G N A L I Z E D   C R I T I C A L   G A P S

APP	CRITICAL GAPS (SEC) LEFT TURN	THROUGH	RIGHT TURN
EB	5.00	---	---
WB	5.00	---	---
NB	6.00	5.50	5.00
SB	6.00	5.50	5.00

V O L U M E   A L L O C A T I O N   T O   L A N E S

APP	LANE 1 L	T	R	LANE 2 L	T	R	LANE 3 L	T	R
EB	80	333	48	0	0	0	0	0	0
WB	0	0	10	0	0	0	0	0	0
NB	116	171	35	0	0	0	0	0	0
SB	10	29	10	0	0	0	0	0	0

U N S I G N A L I Z E D

APP		LANE 1	LANE 2	LANE 3
EB	RESERVE CAPACITY	1107	---	---
	LEVEL OF SERVICE	A		
WB	RESERVE CAPACITY	---	---	---
	LEVEL OF SERVICE			
NB	RESERVE CAPACITY	279	---	---
	LEVEL OF SERVICE	C		
SB	RESERVE CAPACITY	528	---	---
	LEVEL OF SERVICE	A		

MAJOR STREET - EB/WB

1990 PHASE 2 DEVELOPMENT AM AND PM PEAK HOUR OPERATIONS

CASHMAN L1B2AM1

INTERSECTION :
PORTER &
CHELSEA
WEEKDAY PHASE 2 BLD AM 1990 CBD ? N
ACTUATED SIGNAL

V O L U M E   A D J U S T M E N T

APPROACH	LANE MVM	GROUP VOLUME	FLOW RATE IN GROUP	LANE UTIL FACTOR	ADJ FLOW RATE	PROP OF TURNS LT	PROP OF TURNS RT
EB	LTR	446	496	1.00	496	0.33	0.23
WB							
NB	TR	186	207	1.00	207	0.00	0.09
SB	LT	135	150	1.00	150	0.18	0.00

S A T U R A T I O N   F L O W

APP	MVM	IDEAL SAT FLOW	# OF LANES	ADJUSTMENT FACTORS WIDTH	H.V.	GRADE	PARK	BUS	AREA	RT	LT	ADJ. FLOW
EB	LTR	1800	1	1.13	0.99	1.00	1.00	1.00	1.00	0.87	0.86	1507
WB												
NB	TR	1800	1	1.07	0.99	1.00	1.00	1.00	1.00	0.94	1.00	1792
SB	LT	1800	1	1.07	0.99	1.00	1.00	1.00	1.00	1.00	0.92	1754

INTERSECTION :
PORTER @
CHELSEA
WEEKDAY PHASE 2 BLD AM 1990 CBD ? N
ACTUATED SIGNAL

C A P A C I T Y   A N A L Y S I S

APP	LN GR MVM	ADJ FLOW RATE	PMSV LT FLOW	ADJ SAT FLW RT	FLOW RATIO	CRIT ?	GREEN RATIO	LN GR CAPACITY	V/C RATIO
EB	LTR	496	0	1507	0.329	Y	0.529	798	0.622
WB									
NB	TR	207	0	1792	0.116	Y	0.392	703	0.294
SB	LT	150	0	1754	0.086	N	0.392	688	0.218

CYCLE LENGTH : 102.0
LOSS TIME PER CYCLE : 6

SUM OF CRITICAL LANES' FLOW RATIOS : 0.445
INTERSECTION V/C : 0.473

L E V E L   O F   S E R V I C E

APP	LN GR MVM	V/C RATIO	GREEN RATIO	CYC LEN	1st DELAY	LN GR CAP	2nd DELAY	PF	LN GR DELAY	LN GR LOS	APP DELAY	AP LO
EB	LTR	0.622	0.529	102	12.8	798	1.1	0.85	11.8	B	11.8	B
WB												
NB	TR	0.294	0.392	102	16.2	703	0.1	0.85	13.9	B	13.8	B
SB	LT	0.218	0.392	102	15.7	688	0.0	0.85	13.3	B	13.1	B

INTERSECTION DELAY : 12.5 secs/veh
LEVEL OF SERVICE : B

CASHMAN

INTERSECTION :
PORTER @
CHELSEA
WEEKDAY PHASE 2 BLD PM 1990 CBD ? N
ACTUATED SIGNAL

V O L U M E   A D J U S T M E N T

APPROACH	LANE MVM	GROUP VOLUME	FLOW RATE IN GROUP	LANE UTIL FACTOR	ADJ FLOW RATE	PROP OF TURNS LT	RT
EB	LTR	636	707	1.00	707	0.49	0.19
WB							
NB	TR	298	331	1.00	331	0.00	0.13
SB	LT	305	339	1.00	339	0.22	0.00

S A T U R A T I O N   F L O W

APP	MVM	IDEAL SAT FLOW	# OF LANES	ADJUSTMENT FACTORS WIDTH	H.V.	GRADE	PARK	BUS	AREA	RT	LT	ADJ. FLOW
EB	LTR	1800	1	1.13	0.99	1.00	1.00	1.00	1.00	0.88	0.83	1471
WB												
NB	TR	1800	1	1.07	0.99	1.00	1.00	1.00	1.00	0.92	1.00	1754
SB	LT	1800	1	1.07	0.99	1.00	1.00	1.00	1.00	1.00	0.77	1468

CASHMAN L1B2F

INTERSECTION :
PORTER @
CHELSEA
WEEKDAY PHASE 2 BLD PM 1990 CBD ? N
ACTUATED SIGNAL

C A P A C I T Y   A N A L Y S I S

APP	LN GR MVM	ADJ FLOW RATE	PMSV LT FLOW	ADJ SAT FLW RT	FLOW RATIO	CRIT ?	GREEN RATIO	LN GR CAPACITY	V/C RATIO
EB	LTR	707	0	1471	0.481	Y	0.529	779	0.908
WB									
NB	TR	331	0	1754	0.189	N	0.392	688	0.481
SB	LT	339	0	1468	0.231	Y	0.392	576	0.589

CYCLE LENGTH : 102.0 SUM OF CRITICAL LANES' FLOW RATIOS : 0.712
LOSS TIME PER CYCLE : 6 INTERSECTION V/C : 0.756

L E V E L   O F   S E R V I C E

APP	LN GR MVM	V/C RATIO	GREEN RATIO	CYC LEN	1st DELAY	LN GR CAP	2nd DELAY	PF	LN GR DELAY	LN GR LOS	APP DELAY	A L
EB	LTR	0.908	0.529	102	16.5	779	10.4	0.85	22.9	C	22.8	
WB												
NB	TR	0.481	0.392	102	17.7	688	0.4	0.85	15.4	C	15.3	
SB	LT	0.589	0.392	102	18.6	576	1.2	0.85	16.8	C	16.7	

INTERSECTION DELAY : 19.4 secs/veh
LEVEL OF SERVICE : C

CASHMAN [illegible]

INTERSECTION :
PORTER @
ORLEANS
WEEKDAY PHASE 2 BLD AM 1990 CBD ? N
ACTUATED SIGNAL

2

V O L U M E A D J U S T M E N T

APPROACH	LANE MVM	GROUP VOLUME	FLOW RATE IN GROUP	LANE UTIL FACTOR	ADJ FLOW RATE	PROP OF TURNS LT	RT
EB	LTR	213	237	1.00	237	0.24	0.39
WB	LTR	86	96	1.00	96	0.49	0.05
NB	LTR	79	88	1.00	88	0.57	0.37
SB	LTR	38	42	1.00	42	0.11	0.61

S A T U R A T I O N F L O W

APP	MVM	IDEAL SAT FLOW	# OF LANES	ADJUSTMENT FACTORS WIDTH	H.V.	GRADE	PARK	BUS	AREA	RT	LT	ADJ. FLOW
EB	LTR	1800	1	1.13	0.99	1.00	1.00	1.00	1.00	0.85	0.99	1694
WB	LTR	1800	1	1.13	0.99	1.00	1.00	1.00	1.00	0.97	0.85	1660
NB	LTR	1800	1	1.00	0.99	1.00	1.00	1.00	1.00	0.85	0.96	1454
SB	LTR	1800	1	0.90	0.99	1.00	1.00	1.00	1.00	0.82	1.00	1315

CASHMAN L2B3A

INTERSECTION :
PORTER ②
ORLEANS
WEEKDAY PHASE 2 BLD AM 1990 CBD ? N
ACTUATED SIGNAL
2

C A P A C I T Y   A N A L Y S I S

APP	LN GR MVM	ADJ FLOW RATE	PMSV LT FLOW	ADJ SAT FLW RT	FLOW RATIO	CRIT ?	GREEN RATIO	LN GR CAPACITY	V/C RATIO
EB	LTR	237	0	1694	0.140	Y	0.548	928	0.255
WB	LTR	96	0	1660	0.058	N	0.548	910	0.105
NB	LTR	88	0	1454	0.061	Y	0.342	498	0.177
SB	LTR	42	0	1315	0.032	N	0.342	450	0.093

CYCLE LENGTH : 73.0
LOSS TIME PER CYCLE : 6

SUM OF CRITICAL LANES' FLOW RATIOS : 0.201
INTERSECTION V/C : 0.219

L E V E L   O F   S E R V I C E

APP	LN GR MVM	V/C RATIO	GREEN RATIO	CYC LEN	1st DELAY	LN GR CAP	2nd DELAY	PF	LN GR DELAY	LN GR LOS	APP DELAY	A L
EB	LTR	0.255	0.548	73	6.6	928	0.0	0.85	5.6	B	5.6	
WB	LTR	0.105	0.548	73	6.0	910	0.0	0.85	5.1	B	5.0	
NB	LTR	0.177	0.342	73	12.8	498	0.0	0.85	10.9	B	10.7	
SB	LTR	0.093	0.342	73	12.4	450	0.0	0.85	10.5	B	10.0	

INTERSECTION DELAY : 6.9 secs/veh
LEVEL OF SERVICE : B

CASHMAN [illegible]

INTERSECTION :
PORTER Q
ORLEANS
WEEKDAY PHASE 2 BLD PM 1990 CBD ? N
ACTUATED SIGNAL

2

V O L U M E A D J U S T M E N T

APPROACH	LANE MVM	GROUP VOLUME	FLOW RATE IN GROUP	LANE UTIL FACTOR	ADJ FLOW RATE	PROP OF TURNS LT	RT
EB	LTR	266	296	1.00	296	0.06	0.27
WB	LTR	94	104	1.00	104	0.37	0.04
NB	LTR	105	117	1.00	117	0.76	0.17
SB	LTR	32	36	1.00	36	0.12	0.65

S A T U R A T I O N F L O W

APP	MVM	IDEAL SAT FLOW	# OF LANES	ADJUSTMENT FACTORS WIDTH	H.V.	GRADE	PARK	BUS	AREA	RT	LT	ADJ. FLOW
EB	LTR	1800	1	1.13	0.99	1.00	1.00	1.00	1.00	0.86	1.00	1732
WB	LTR	1800	1	1.13	0.99	1.00	1.00	1.00	1.00	0.97	0.83	1621
NB	LTR	1800	1	1.00	0.99	1.00	1.00	1.00	1.00	0.89	0.93	1475
SB	LTR	1800	1	0.90	0.99	1.00	1.00	1.00	1.00	0.81	1.00	1299

CASHMAN .2B2F

INTERSECTION :
PORTER D
ORLEANS
WEEKDAY PHASE 2 BLD PM 1990 CBD ? N
ACTUATED SIGNAL
2

C A P A C I T Y   A N A L Y S I S

APP	LN GR MVM	ADJ FLOW RATE	PMSV LT FLOW	ADJ SAT FLW RT	FLOW RATIO	CRIT ?	GREEN RATIO	LN GR CAPACITY	V/C RATIO
EB	LTR	296	0	1732	0.171	Y	0.548	949	0.312
WB	LTR	104	0	1621	0.064	N	0.548	888	0.117
NB	LTR	117	0	1475	0.079	Y	0.342	505	0.232
SB	LTR	36	0	1299	0.028	N	0.342	445	0.081

CYCLE LENGTH : 73.0 SUM OF CRITICAL LANES' FLOW RATIOS : 0.250
LOSS TIME PER CYCLE : 6 INTERSECTION V/C : 0.272

L E V E L   O F   S E R V I C E

APP	LN GR MVM	V/C RATIO	GREEN RATIO	CYC LEN	1st DELAY	LN GR CAP	2nd DELAY	PF	LN GR DELAY	LN GR LOS	APP DELAY	A L
EB	LTR	0.312	0.548	73	6.8	949	0.1	0.85	5.9	B	5.9	
WB	LTR	0.117	0.548	73	6.1	888	0.0	0.85	5.2	B	5.1	
NB	LTR	0.232	0.342	73	13.0	505	0.0	0.85	11.0	B	10.8	
SB	LTR	0.081	0.342	73	12.3	445	0.0	0.85	10.5	B	9.9	

INTERSECTION DELAY : 7.1 secs/veh
LEVEL OF SERVICE : B

CASHMAN AF.AM

INTERSECTION :
SUMNER @
MERIDIAN
WEEKDAY PHASE 2 BLD AM 1990 CBD N
ACTUATED SIGNAL

3A

V O L U M E   A D J U S T M E N T

APPROACH	LANE GROUP MVM	VOLUME	FLOW RATE IN GROUP	LANE UTIL FACTOR	ADJ FLOW RATE	PROP OF TURNS LT	RT
EB	LT	194	216	1.00	216	0.55	0.00
WB	T	82	91	1.00	91	0.00	0.00
	R	303	337	1.00	337	0.00	1.00
SB	R	10	11	1.00	11	0.00	1.00

S A T U R A T I O N   F L O W

APP	MVM	IDEAL SAT FLOW	# OF LANES	ADJUSTMENT FACTORS WIDTH	H.V.	GRADE	PARK	BUS	AREA	RT	LT	ADJ. FLOW
EB	LT	1800	1	1.13	0.99	1.00	1.00	1.00	1.00	1.00	0.68	1369
WB	T	1800	1	1.13	0.99	1.00	1.00	1.00	1.00	1.00	1.00	2014
	R	1800	1	1.03	0.99	1.00	1.00	1.00	1.00	0.85	1.00	1560
SB	R	1800	1	0.87	0.99	1.00	1.00	1.00	1.00	0.85	1.00	1318

INTERSECTION :
SUMNER @
MERIDIAN
WEEKDAY PHASE 2 BLD AM 1990 CBD ? N
ACTUATED SIGNAL

3A

C A P A C I T Y   A N A L Y S I S

APP	LN GR MVM	ADJ FLOW RATE	PMSV LT FLOW	ADJ SAT FLW RT	FLOW RATIO	CRIT ?	GREEN RATIO	LN GR CAPACITY	V/C RATIO
EB	LT	216	0	1369	0.158	N	0.286	391	0.552
WB	T	91	0	2014	0.045	N	0.286	575	0.158
	R	337	0	1560	0.216	Y	0.286	446	0.756
SB	R	11	0	1318	0.008	Y	0.357	471	0.023

CYCLE LENGTH : 70.0
LOSS TIME PER CYCLE : 6

SUM OF CRITICAL LANES' FLOW RATIOS : 0.224
INTERSECTION V/C : 0.245

L E V E L   O F   S E R V I C E

APP	LN GR MVM	V/C RATIO	GREEN RATIO	CYC LEN	1st DELAY	LN GR CAP	2nd DELAY	PF	LN GR DELAY	LN GR LOS	APP DELAY	AP LO
EB	LT	0.552	0.286	70	16.1	391	1.3	0.85	14.8	B	14.7	B
WB	T	0.158	0.286	70	14.2	575	0.0	0.85	12.1	B		
	R	0.756	0.286	70	17.3	446	5.0	0.85	19.0	C	17.5	C
SB	R	0.023	0.357	70	11.1	471	0.0	0.85	9.4	B	8.0	B

INTERSECTION DELAY : 16.3 secs/veh
LEVEL OF SERVICE : C

CASHMAN

INTERSECTION :
SUMNER 3
MERIDIAN
WEEKDAY PHASE 2 BLD PM 1990 CBD ? N
ACTUATED SIGNAL

3A

V O L U M E A D J U S T M E N T

APPROACH	LANE MVM	GROUP VOLUME	FLOW RATE IN GROUP	LANE UTIL FACTOR	ADJ FLOW RATE	PROP OF TURNS LT	RT
EB	LT	186	207	1.00	207	0.48	0.00
WB	T	85	94	1.00	94	0.00	0.00
	R	306	340	1.00	340	0.00	1.00
SB	R	10	11	1.00	11	0.00	1.00

S A T U R A T I O N F L O W

APP	MVM	IDEAL SAT FLOW	# OF LANES	WIDTH	H.V.	GRADE	PARK	BUS	AREA	RT	LT	ADJ. FLOW
				ADJUSTMENT FACTORS								
EB	LT	1800	1	1.13	0.99	1.00	1.00	1.00	1.00	1.00	0.71	1430
WB	T	1800	1	1.13	0.99	1.00	1.00	1.00	1.00	1.00	1.00	2014
	R	1800	1	1.03	0.99	1.00	1.00	1.00	1.00	0.85	1.00	1560
SB	R	1800	1	0.87	0.99	1.00	1.00	1.00	1.00	0.85	1.00	1318

CASHMAN LIAB

INTERSECTION :
SUMNER D
MERIDIAN
WEEKDAY PHASE 2 BLD PM 1990 CBD ? N
ACTUATED SIGNAL

3A

C A P A C I T Y A N A L Y S I S

APP	LN GR MVM	ADJ FLOW RATE	PMSV LT FLOW	ADJ SAT FLW RT	FLOW RATIO	CRIT ?	GREEN RATIO	LN GR CAPACITY	V/C RATIO
EB	LT	207	0	1430	0.145	N	0.286	409	0.506
WB	T	94	0	2014	0.047	N	0.286	575	0.163
	R	340	0	1560	0.218	Y	0.286	446	0.762
SB	R	11	0	1318	0.008	Y	0.357	471	0.023

CYCLE LENGTH : 70.0
LOSS TIME PER CYCLE : 6

SUM OF CRITICAL LANES' FLOW RATIOS : 0.226
INTERSECTION V/C : 0.247

L E V E L O F S E R V I C E

APP	LN GR MVM	V/C RATIO	GREEN RATIO	CYC LEN	1st DELAY	LN GR CAP	2nd DELAY	PF	LN GR DELAY	LN GR LOS	APP DELAY	AP LO
EB	LT	0.506	0.286	70	15.9	409	0.9	0.85	14.3	B	14.2	[illegible]
WB	T	0.163	0.286	70	14.2	575	0.0	0.85	12.1	B		
	R	0.762	0.286	70	17.3	446	5.2	0.85	19.1	C	17.5	[illegible]
SB	R	0.023	0.357	70	11.1	471	0.0	0.85	9.4	B	8.0	[illegible]

INTERSECTION DELAY : 16.2 secs/veh
LEVEL OF SERVICE : C

CASHMAN

INTERSECTION :
SUMNER @
CHELSEA
WEEKDAY PHASE 2 BLD AM 1990 CBD ? N
ACTUATED SIGNAL

3b

V O L U M E   A D J U S T M E N T

APPROACH	LANE GROUP MVM	VOLUME	FLOW RATE IN GROUP	LANE UTIL FACTOR	ADJ FLOW RATE	PROP OF TURNS LT	RT
EB	T	87	97	1.00	97	0.00	0.00
WB	T	188	209	1.05	219	0.00	0.00
SB	L	309	343	1.00	343	1.00	0.00
	R	197	219	1.00	219	0.00	1.00

S A T U R A T I O N   F L O W

APP	MVM	IDEAL SAT FLOW	# OF LANES	ADJUSTMENT FACTORS WIDTH	H.V.	GRADE	PARK	BUS	AREA	RT	LT	ADJ. FLOW
EB	T	1800	1	1.13	0.99	1.00	1.00	1.00	1.00	1.00	1.00	2014
WB	T	1800	2	1.08	0.99	1.00	1.00	1.00	1.00	1.00	1.00	3849
SB	L	1800	1	1.13	0.99	1.00	1.00	1.00	1.00	1.00	0.85	1712
	R	1800	1	1.13	0.99	1.00	1.00	1.00	1.00	0.85	1.00	1712

CASHMAN CEB2

INTERSECTION :
SUMNER D
CHELSEA
WEEKDAY PHASE 2 BLD AM 1990 CBD ? N
ACTUATED SIGNAL

3b

CAPACITY ANALYSIS

APP	LN GR MVM	ADJ FLOW RATE	PMSV LT FLOW	ADJ SAT FLW RT	FLOW RATIO	CRIT ?	GREEN RATIO	LN GR CAPACITY	V/C RATIO
EB	T	97	0	2014	0.048	N	0.286	575	0.169
WB	T	219	0	3849	0.057	Y	0.286	1100	0.199
SB	L	343	0	1712	0.200	Y	0.357	611	0.561
	R	219	0	1712	0.128	N	0.357	611	0.358

CYCLE LENGTH : 70.0
LOSS TIME PER CYCLE : 6

SUM OF CRITICAL LANES' FLOW RATIOS : 0.257
INTERSECTION V/C : 0.281

LEVEL OF SERVICE

APP	LN GR MVM	V/C RATIO	GREEN RATIO	CYC LEN	1st DELAY	LN GR CAP	2nd DELAY	PF	LN GR DELAY	LN GR LOS	APP DELAY	APP LOS
EB	T	0.169	0.286	70	14.3	575	0.0	0.85	12.2	B	12.0	[illegible]
WB	T	0.199	0.286	70	14.4	1100	0.0	0.85	12.2	B	12.1	[illegible]
SB	L	0.561	0.357	70	13.7	611	0.9	0.85	12.4	B		
	R	0.358	0.357	70	12.6	611	0.2	0.85	10.9	B	11.8	[illegible]

INTERSECTION DELAY : 11.9 secs/veh
LEVEL OF SERVICE : B

 HMM ASSOCIATES 1/15/1988

CASHMAN LT2B2PM

INTERSECTION :
SUMNER @
CHELSEA
WEEKDAY PHASE 2BLD PM 1990 CBD ? N
ACTUATED SIGNAL

3b

V O L U M E   A D J U S T M E N T

APPROACH	LANE MVM	GROUP VOLUME	FLOW RATE IN GROUP	LANE UTIL FACTOR	ADJ FLOW RATE	PROP OF TURNS LT	PROP OF TURNS RT
EB	T	97	108	1.00	108	0.00	0.00
WB	T	152	169	1.05	177	0.00	0.00
SB	L	358	398	1.00	398	1.00	0.00
	R	239	266	1.00	266	0.00	1.00

S A T U R A T I O N   F L O W

APP	MVM	IDEAL SAT FLOW	# OF LANES	ADJUSTMENT FACTORS: WIDTH	H.V.	GRADE	PARK	BUS	AREA	RT	LT	ADJ. FLOW
EB	T	1800	1	1.13	0.99	1.00	1.00	1.00	1.00	1.00	1.00	2014
WB	T	1800	2	1.08	0.99	1.00	1.00	1.00	1.00	1.00	1.00	3849
SB	L	1800	1	1.13	0.99	1.00	1.00	1.00	1.00	1.00	0.85	1712
	R	1800	1	1.13	0.99	1.00	1.00	1.00	1.00	0.85	1.00	1712

CASHMAN [illegible]

INTERSECTION :
SUMNER 3
CHELSEA
WEEKDAY PHASE 2BLD PM 1990 CBD ? N
ACTUATED SIGNAL

3b

C A P A C I T Y   A N A L Y S I S

APP	LN GR MVM	ADJ FLOW RATE	PMSV LT FLOW	ADJ SAT FLW RT	FLOW RATIO	CRIT ?	GREEN RATIO	LN GR CAPACITY	V/C RATIO
EB	T	108	0	2014	0.054	Y	0.286	575	0.188
WB	T	177	0	3849	0.046	N	0.286	1100	0.161
SB	L	398	0	1712	0.232	Y	0.357	611	0.651
	R	266	0	1712	0.155	N	0.357	611	0.435

CYCLE LENGTH : 70.0
LOSS TIME PER CYCLE : 6

SUM OF CRITICAL LANES' FLOW RATIOS : 0.286
INTERSECTION V/C : 0.313

L E V E L   O F   S E R V I C E

APP	LN GR MVM	V/C RATIO	GREEN RATIO	CYC LEN	1st DELAY	LN GR CAP	2nd DELAY	PF	LN GR DELAY	LN GR LOS	APP DELAY	A L
EB	T	0.188	0.286	70	14.3	575	0.0	0.85	12.2	B	12.0	
WB	T	0.161	0.286	70	14.2	1100	0.0	0.85	12.1	B	12.0	
SB	L	0.651	0.357	70	14.3	611	1.7	0.85	13.6	B		
	R	0.435	0.357	70	13.0	611	0.3	0.85	11.3	B	12.7	

INTERSECTION DELAY : 12.4 secs/veh
LEVEL OF SERVICE : B

INTERSECTION :
PORTER D
BREMEN
WEEKDAY PHASE 2 BLD AM 1990 CBD-N
UNSIGNALIZED
- MAJOR STREET RUNS EAST / WEST

4

U N S I G N A L I Z E D   C R I T I C A L   G A P S

APP	CRITICAL GAPS (SEC) LEFT TURN	THROUGH	RIGHT TURN
EB	5.00	---	---
WB	5.00	---	---
NB	6.50	6.00	5.50
SB	6.50	6.00	5.50

V O L U M E   A L L O C A T I O N   T O   L A N E S

APP	LANE 1 L	T	R	LANE 2 L	T	R	LANE 3 L	T	R
EB	49	0	0	0	156	35	0	0	0
WB	7	44	47	0	0	0	0	0	0
NB	2	28	0	0	0	0	0	0	0
SB	80	202	0	0	0	0	0	0	0

U N S I G N A L I Z E D

APP		LANE 1	LANE 2	LANE 3
EB	RESERVE CAPACITY	1046	---	---
	LEVEL OF SERVICE	A		
WB	RESERVE CAPACITY	982	---	---
	LEVEL OF SERVICE	A		
NB	RESERVE CAPACITY	605	---	---
	LEVEL OF SERVICE	A		
SB	RESERVE CAPACITY	371	---	---
	LEVEL OF SERVICE	B		

MAJOR STREET - EB/WB

INTERSECTION :
PORTER &
BREMEN
WEEKDAY PHASE 2 BLD PM 1990 CBD?N
UNSIGNALIZED
- MAJOR STREET RUNS EAST / WEST
4

U N S I G N A L I Z E D   C R I T I C A L   G A P S

APP	LEFT TURN	THROUGH	RIGHT TURN
	------------CRITICAL GAPS (SEC)----------		
EB	5.00	---	---
WB	5.00	---	---
NB	6.50	6.00	5.50
SB	6.50	6.00	5.50

V O L U M E   A L L O C A T I O N   T O   L A N E S

APP	LANE 1			LANE 2			LANE 3		
	L	T	R	L	T	R	L	T	R
EB	38	0	0	0	243	38	0	0	0
WB	3	90	53	0	0	0	0	0	0
NB	20	140	11	0	0	0	0	0	0
SB	94	175	0	0	0	0	0	0	0

U N S I G N A L I Z E D

APP		LANE 1	LANE 2	LANE 3
EB	RESERVE CAPACITY	1000	---	---
	LEVEL OF SERVICE	A		
WB	RESERVE CAPACITY	897	---	---
	LEVEL OF SERVICE	A		
NB	RESERVE CAPACITY	362	---	---
	LEVEL OF SERVICE	B		
SB	RESERVE CAPACITY	214	---	---
	LEVEL OF SERVICE	C		

MAJOR STREET - EB/WB

INTERSECTION :
MAVERICK &
MERIDIAN
WEEKDAY PHASE 2 BLD AM 1990 CBDTN
UNSIGNALIZED
- MAJOR STREET RUNS EAST / WEST

5A

U N S I G N A L I Z E D   C R I T I C A L   G A P S

APP	CRITICAL GAPS (SEC) LEFT TURN	THROUGH	RIGHT TURN
EB	5.00	---	---
WB	5.00	---	---
NB	6.00	5.50	5.00
SB	6.00	5.50	5.00

V O L U M E   A L L O C A T I O N   T O   L A N E S

APP	LANE 1 L	T	R	LANE 2 L	T	R	LANE 3 L	T	R
EB	0	1	0	0	0	0	0	0	0
WB	0	59	0	0	0	229	0	0	0
NB	28	0	0	0	326	77	0	0	0
SB	296	0	24	0	0	0	0	0	0

U N S I G N A L I Z E D

APP		LANE 1	LANE 2	LANE 3
EB	RESERVE CAPACITY	---	---	---
	LEVEL OF SERVICE			
WB	RESERVE CAPACITY	---	---	---
	LEVEL OF SERVICE			
NB	RESERVE CAPACITY	875	442	---
	LEVEL OF SERVICE	A	A	
SB	RESERVE CAPACITY	70	---	---
	LEVEL OF SERVICE	E		

MAJOR STREET - EB/WB

INTERSECTION :
MAVERICK @
MERIDIAN
WEEKDAY PHASE 2 BLD PM 1990 CBD?N
UNSIGNALIZED
- MAJOR STREET RUNS EAST / WEST

5A

UNSIGNALIZED CRITICAL GAPS

APP	LEFT TURN	THROUGH	RIGHT TURN
	CRITICAL GAPS (SEC)		
EB	5.00	---	---
WB	5.00	---	---
NB	6.00	5.50	5.00
SB	6.00	5.50	5.00

VOLUME ALLOCATION TO LANES

APP	LANE 1 L	LANE 1 T	LANE 1 R	LANE 2 L	LANE 2 T	LANE 2 R	LANE 3 L	LANE 3 T	LANE 3 R
EB	0	1	0	0	0	0	0	0	0
WB	0	44	0	0	0	360	0	0	0
NB	21	0	0	0	309	138	0	0	0
SB	324	0	48	0	0	0	0	0	0

UNSIGNALIZED

APP		LANE 1	LANE 2	LANE 3
EB	RESERVE CAPACITY	---	---	---
	LEVEL OF SERVICE			
WB	RESERVE CAPACITY	---	---	---
	LEVEL OF SERVICE			
NB	RESERVE CAPACITY	859	346	---
	LEVEL OF SERVICE	A	B	
SB	RESERVE CAPACITY	-13	---	---
	LEVEL OF SERVICE	FAILURE		

MAJOR STREET - EB/WB

INTERSECTION :
MAVERICK @
CHELSEA
WEEKDAY PHASE 2 BLD AM 1990 CBD?N
UNSIGNALIZED
- MAJOR STREET RUNS EAST / WEST

SB

U N S I G N A L I Z E D   C R I T I C A L   G A P S

APP	CRITICAL GAPS (SEC) LEFT TURN	THROUGH	RIGHT TURN
EB	5.00	---	---
WB	5.00	---	---
NB	0.00	0.00	0.00
SB	6.50	6.00	5.50

V O L U M E   A L L O C A T I O N   T O   L A N E S

APP	LANE 1 L	T	R	LANE 2 L	T	R	LANE 3 L	T	R
EB	66	0	0	0	0	308	0	0	0
WB	53	132	0	0	128	110	0	0	0
NB	0	0	0	0	0	0	0	0	0
SB	0	145	28	0	0	0	0	0	0

U N S I G N A L I Z E D

APP		LANE 1	LANE 2	LANE 3
EB	RESERVE CAPACITY	752	---	---
	LEVEL OF SERVICE	A		
WB	RESERVE CAPACITY	821	---	---
	LEVEL OF SERVICE	A		
NB	RESERVE CAPACITY	---	---	---
	LEVEL OF SERVICE			
SB	RESERVE CAPACITY	[illegible]	---	---
	LEVEL OF SERVICE			

MAJOR STREET - EB/WB

INTERSECTION :
MAVERICK @
CHELSEA
WEEKDAY PHASE 2 BLD PM 1990 CBD^N
UNSIGNALIZED
- MAJOR STREET RUNS EAST / WEST

U N S I G N A L I Z E D   C R I T I C A L   G A P S

	----CRITICAL GAPS (SEC)----		
APP	LEFT TURN	THROUGH	RIGHT TURN
EB	5.00	---	---
WB	5.00	---	---
NB	0.00	0.00	0.00
SB	6.50	6.00	5.00

V O L U M E   A L L O C A T I O N   T O   L A N E S

	LANE 1			LANE 2			LANE 3		
APP	L	T	R	L	T	R	L	T	R
EB	102	0	0	0	0	358	0	0	0
WB	59	185	0	0	149	154	0	0	0
NB	0	0	0	0	0	0	0	0	0
SB	0	175	70	0	0	0	0	0	0

U N S I G N A L I Z E D

APP		LANE 1	LANE 2	LANE 3
EB	RESERVE CAPACITY	617	---	---
	LEVEL OF SERVICE	A		
WB	RESERVE CAPACITY	770	---	---
	LEVEL OF SERVICE	A		
NB	RESERVE CAPACITY	---	---	---
	LEVEL OF SERVICE			
SB	RESERVE CAPACITY	79	---	---
	LEVEL OF SERVICE	E		

MAJOR STREET - EB/WB

INTERSECTION :
MAVERICK ST
ORLEANS
WEEKDAY PHASE 2 BLD AM 1990 CBD=N
UNSIGNALIZED
- MAJOR STREET RUNS EAST / WEST
6

U N S I G N A L I Z E D   C R I T I C A L   G A P S

APP	CRITICAL GAPS (SEC) LEFT TURN	THROUGH	RIGHT TURN
EB	5.00	---	---
WB	5.00	---	---
NB	6.50	6.00	5.50
SB	6.50	6.00	5.50

V O L U M E   A L L O C A T I O N   T O   L A N E S

APP	LANE 1 L	LANE 1 T	LANE 1 R	LANE 2 L	LANE 2 T	LANE 2 R	LANE 3 L	LANE 3 T	LANE 3 R
EB	0	0	10	0	0	0	0	0	0
WB	24	0	0	0	320	3	0	0	0
NB	75	68	0	0	0	0	0	0	0
SB	0	63	14	0	0	0	0	0	0

U N S I G N A L I Z E D

APP		LANE 1	LANE 2	LANE 3
EB	RESERVE CAPACITY	---	---	---
	LEVEL OF SERVICE			
WB	RESERVE CAPACITY	1164	---	---
	LEVEL OF SERVICE	A		
NB	RESERVE CAPACITY	423	---	---
	LEVEL OF SERVICE	A		
SB	RESERVE CAPACITY	590	---	---
	LEVEL OF SERVICE	A		

MAJOR STREET - EB/WB

INTERSECTION :
MAVERICK &
ORLEANS
WEEKDAY PHASE 2 BLD PM 1990 CBD~N
UNSIGNALIZED
- MAJOR STREET RUNS EAST / WEST
6

UNSIGNALIZED CRITICAL GAPS

	CRITICAL GAPS (SEC)		
APP	LEFT TURN	THROUGH	RIGHT TURN
EB	5.00	---	---
WB	5.00	---	---
NB	6.50	6.00	5.50
SB	6.50	6.00	5.50

VOLUME ALLOCATION TO LANES

	LANE 1			LANE 2			LANE 3		
APP	L	T	R	L	T	R	L	T	R
EB	0	0	10	0	0	0	0	0	0
WB	31	0	0	0	349	15	0	0	0
NB	153	79	0	0	0	0	0	0	0
SB	0	39	39	0	0	0	0	0	0

UNSIGNALIZED

APP		LANE 1	LANE 2	LANE 3
EB	RESERVE CAPACITY LEVEL OF SERVICE	---	---	---
WB	RESERVE CAPACITY LEVEL OF SERVICE	1157 A	---	---
NB	RESERVE CAPACITY LEVEL OF SERVICE	284 C	---	---
SB	RESERVE CAPACITY LEVEL OF SERVICE	590 A	---	---

MAJOR STREET - EB/WB

INTERSECTION :
SUMNER @
BREMEN
WEEKDAY PHASE 2 BLD AM 1990 CBD'N
UNSIGNALIZED
- MAJOR STREET RUNS EAST / WEST

8

U N S I G N A L I Z E D C R I T I C A L G A P S

APP	LEFT TURN	THROUGH	RIGHT TURN
	CRITICAL GAPS (SEC)		
EB	5.00	---	---
WB	5.00	---	---
NB	6.50	6.00	5.50
SB	6.50	6.00	5.50

V O L U M E A L L O C A T I O N T O L A N E S

APP	LANE 1			LANE 2			LANE 3		
	L	T	R	L	T	R	L	T	R
EB	28	322	46	0	0	0	0	0	0
WB	1	111	13	0	0	0	0	0	0
NB	33	67	15	0	0	0	0	0	0
SB	67	24	44	0	0	0	0	0	0

U N S I G N A L I Z E D

APP		LANE 1	LANE 2	LANE 3
EB	RESERVE CAPACITY	1031	---	---
	LEVEL OF SERVICE	A		
WB	RESERVE CAPACITY	820	---	---
	LEVEL OF SERVICE	A		
NB	RESERVE CAPACITY	403	---	---
	LEVEL OF SERVICE	A		
SB	RESERVE CAPACITY	377	---	---
	LEVEL OF SERVICE	B		

MAJOR STREET - EB/WB

INTERSECTION :
SUMNER 9
BREMEN
WEEKDAY PHASE 2 BLD PM 1990 CBDTN
UNSIGNALIZED
- MAJOR STREET RUNS EAST / WEST

8

U N S I G N A L I Z E D   C R I T I C A L   G A P S

APP	LEFT TURN	THROUGH	RIGHT TURN
	CRITICAL GAPS (SEC)		
EB	5.00	---	---
WB	5.00	---	---
NB	6.50	6.00	5.50
SB	6.50	6.00	5.50

V O L U M E   A L L O C A T I O N   T O   L A N E S

APP	LANE 1 L	LANE 1 T	LANE 1 R	LANE 2 L	LANE 2 T	LANE 2 R	LANE 3 L	LANE 3 T	LANE 3 R
EB	24	365	64	0	0	0	0	0	0
WB	1	109	13	0	0	0	0	0	0
NB	26	58	33	0	0	0	0	0	0
SB	91	19	16	0	0	0	0	0	0

U N S I G N A L I Z E D

APP		LANE 1	LANE 2	LANE 3
EB	RESERVE CAPACITY	1037	---	---
	LEVEL OF SERVICE	A		
WB	RESERVE CAPACITY	767	---	---
	LEVEL OF SERVICE	A		
NB	RESERVE CAPACITY	411	---	---
	LEVEL OF SERVICE	A		
SB	RESERVE CAPACITY	274	---	---
	LEVEL OF SERVICE	C		

MAJOR STREET - EB/WB

INTERSECTION :
SUMNER @
ORLEANS
WEEKDAY PHASE 2 BLD AM 1990 CBDTN
UNSIGNALIZED
- MAJOR STREET RUNS EAST / WEST

U N S I G N A L I Z E D   C R I T I C A L   G A P S

APP	LEFT TURN	THROUGH	RIGHT TURN
	------------CRITICAL GAPS (SEC)------------		
EB	5.00	---	---
WB	5.00	---	---
NB	6.00	5.50	5.00
SB	6.00	5.50	5.00

V O L U M E   A L L O C A T I O N   T O   L A N E S

APP	LANE 1 L	LANE 1 T	LANE 1 R	LANE 2 L	LANE 2 T	LANE 2 R	LANE 3 L	LANE 3 T	LANE 3 R
EB	53	175	133	0	0	0	0	0	0
WB	0	0	10	0	0	0	0	0	0
NB	126	107	15	0	0	0	0	0	0
SB	29	47	4	0	0	0	0	0	0

U N S I G N A L I Z E D

APP		LANE 1	LANE 2	LANE 3
EB	RESERVE CAPACITY	1134	---	---
	LEVEL OF SERVICE	A		
WB	RESERVE CAPACITY	---	---	---
	LEVEL OF SERVICE			
NB	RESERVE CAPACITY	442	---	---
	LEVEL OF SERVICE	A		
SB	RESERVE CAPACITY	546	---	---
	LEVEL OF SERVICE	A		

MAJOR STREET - EB/WB

INTERSECTION :
SUMNER ③
ORLEANS
WEEKDAY PHASE 2 BLD PM 1990 CBD^N
UNSIGNALIZED
- MAJOR STREET RUNS EAST / WEST

9

U N S I G N A L I Z E D C R I T I C A L G A P S

APP	LEFT TURN	THROUGH	RIGHT TURN
	CRITICAL GAPS (SEC)		
EB	5.00	---	---
WB	5.00	---	---
NB	6.00	5.50	5.00
SB	6.00	5.50	5.00

V O L U M E A L L O C A T I O N T O L A N E S

APP	LANE 1			LANE 2			LANE 3		
	L	T	R	L	T	R	L	T	R
EB	80	333	75	0	0	0	0	0	0
WB	0	0	10	0	0	0	0	0	0
NB	123	197	35	0	0	0	0	0	0
SB	10	40	10	0	0	0	0	0	0

U N S I G N A L I Z E D

APP		LANE 1	LANE 2	LANE 3
EB	RESERVE CAPACITY	1107	---	---
	LEVEL OF SERVICE	A		
WB	RESERVE CAPACITY	---	---	---
	LEVEL OF SERVICE			
NB	RESERVE CAPACITY	229	---	---
	LEVEL OF SERVICE	C		
SB	RESERVE CAPACITY	492	---	---
	LEVEL OF SERVICE	A		

MAJOR STREET - EB/WB

INTERSECTION :
SUMNER D
ORLEANS
WEEKDAY PHASE 2 BLD PM 1990 CBD^N
UNSIGNALIZED
- MAJOR STREET RUNS EAST / WEST

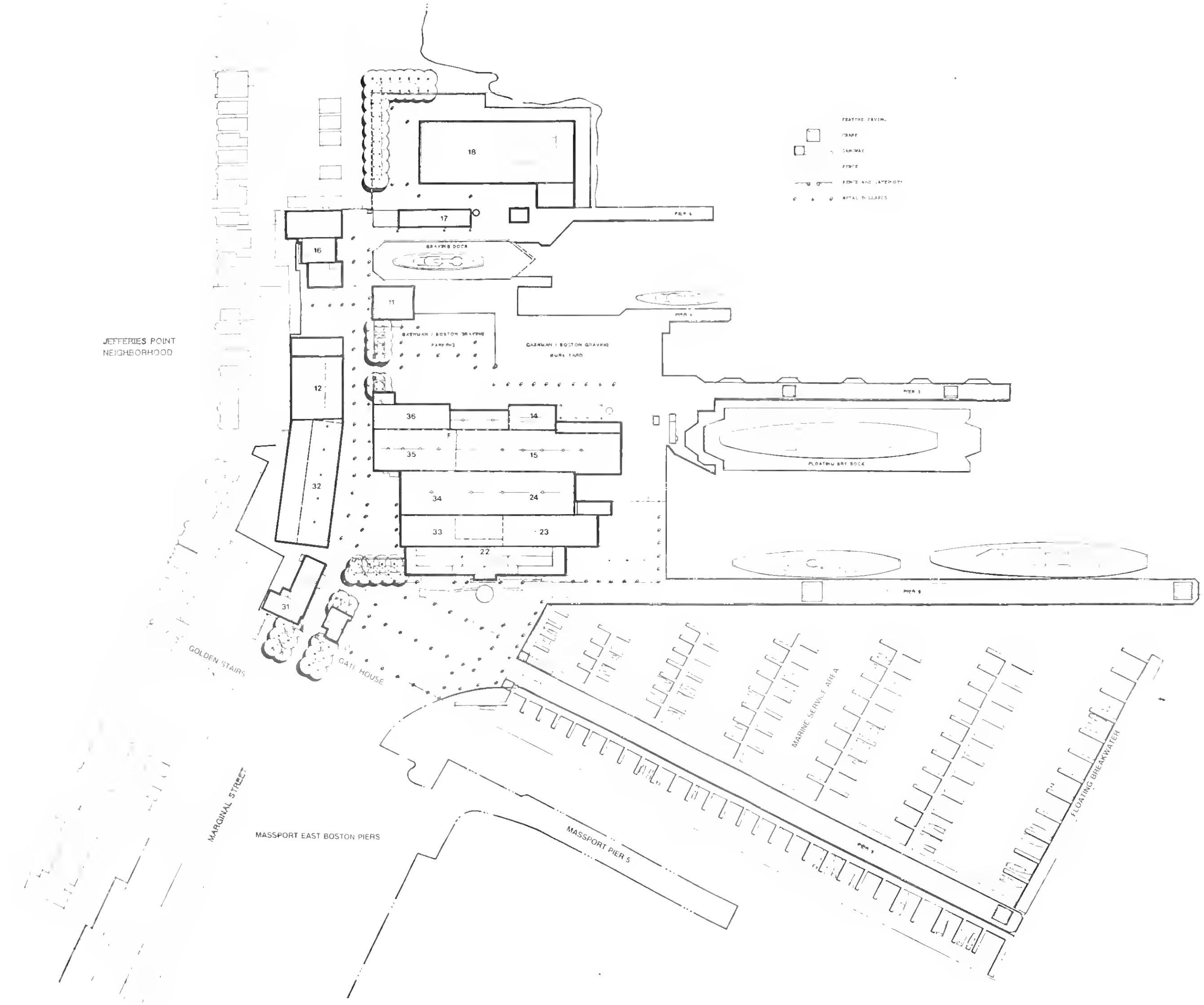
9

U N S I G N A L I Z E D   C R I T I C A L   G A P

APP	LEFT TURN	THROUGH
	CRITICAL GAPS (SEC)	
EB	5.00	---
WB	5.00	
NB	6.00	
SB	6.00	

V

THE BOSTON MARINE WORKS
FINAL ENVIRONMENTAL IMPACT
REPORT



For:
CASHMAN MARINE
ENTERPRISES, INC.
East Boston, MA 02128

ILLUSTRATIVE SITE PLAN

MARINE WORKS